

*Centennial Edition*

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**OBLIQUELY  
CONTRACTED PELVIS**

Dr. Franz Carl Naegele

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AUTHOR		
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DR. Naegele Franz C

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**THE**  
**OBLIQUELY CONTRACTED PELVIS**

containing also an

**A P P E N D I X**

of the most important

**DEFECTS OF THE FEMALE PELVIS**

*by*

**Dr. Franz Carl Naegele,**

Geheimrat of the Grand-Duchy of Baden, Commandeur of the order of the Lion of Zaehringen of the Grand-Duchy of Baden, Professor Ordinarius of Medicine and Obstetrics, Director of the Lying-in Hospital Heidelberg, Member of the Russian Imperial Academy of Natural Scientists of Moscow, of the Royal Academy of Medicine of Paris, of the Royal Medical Societies of Copenhagen and of Stockholm, of the Russian Imperial Medical Society and of the University of Wilna, of the Society for Medical Science of Prussia, of the Societies of Medicine and Natural Science of Berlin, Bonn, Dijon, Heidelberg, Jassy, Leipzig, Lyon, Mainz, Marseille, New York, Philadelphia, Rostock, in the Wetterau, etc.

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**WITH SIXTEEN PLATES.**

**MAINZ,**

**PUBLISHED by VICTOR VON ZABERN,**  
**1839.**

*Centennial Edition, Newly Translated from the Original German, New York, 1939.*

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“Multum restat adhuc operis, multumque restabit: nec ulli nato post mille sæcula præcludetur occasio aliquid adhuc adjiciendi.” Seneca *Epist.* 64.

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## Translator's Preface

**I**N NINETEEN THIRTY-NINE, one hundred years will have passed since Prof. Franz Carl Naegele published the result of his many years of careful, laborious work. This publication marked an epoch in the medical world. The title in German reads:

*Das Schräg Verengte Becken*

Not only was this original work of immediate value to all practicing obstetricians, but the ensuing one hundred years have added little or nothing to Naegele's contribution. The original contains one-hundred-and-twenty pages of text and also sixteen lithograph plates in two colors, excellent in detail, well printed, and of great usefulness. We have here reproduced these lithographs so that they can scarcely, if at all, be distinguished from the originals. Text books today largely adhere to Naegele's descriptions and his *Obliquely Contracted Pelvis* is familiarly referred to as the "Naegele Pelvis." Very few medical men or rare book collectors have ever seen a copy of the German work, although it continues to be one of the most important books in this field of medicine. Consequently at this time it would seem particularly appropriate to plan a centennial edition of this work in the spirit of the first edition.

It was found to be a very difficult task to translate the German and retain some of the flowery, involved style and yet make the English clear. None the less, every effort was made to accomplish just this. If our English seems imperfect and even incorrect, it is due to our attempt to accurately reproduce the quaint descriptions in which the original is so rich and detailed. In one part of the mono-

graph Naegele speaks of the good work of "Stein the Nephew," who was writing on obstetrics at the same time and states that this author's work was not as well recognized and received as it should have been because it was so involved; evidently not realizing that his own work contained—maybe to a less degree—similar faults.

In 1840 a French translation done by A. C. Danyau of the faculty of the Paris Academy of Medicine made its appearance. This French edition contained reproductions of the sixteen plates—reduced in size—done only in one color and substituting two of Danyau's for two of the master's. The plates in the French edition compare most unfavorably with those of the German volume. Danyau adds some observations of his own, so this edition cannot be looked upon as an exact translation.

In 1848 John Christie, M.D., F.R.C.S., brought out a book on the pelvis. This London edition was based on both the German and the French, and naturally does not contain the text as written by Naegele, but does contain many mistakes probably due to not better understanding the involved German.

These two editions make it only more important that a proper translation be made for the benefit of the English reading public. Even copies of the two translations are rare, while the original monograph seems to be almost unattainable. There is no copy of the original in the library of the New York Academy of Medicine, and the one in the Surgeon General's library at Washington is in poor condition. The copy from which this present translation is made,

and the plates reproduced, is in the possession of one of the present translators and was purchased in Berlin in 1914. Since then the owner has not found another copy listed in any dealer's catalogue, nor heard of one available. Since sending out the prospectus for this translation, we have learned of two more copies in this country (this makes four in all), one in Philadelphia—College of Physicians Library—and one owned by Dr. Julius Jarcho of New York.

The publication of this centennial edition of Naegele is the sort of adventure that appeals particularly to the bibliophile. It makes available an unusually scarce and authoritative work in a form that will give pleasure to many. It has a special appeal to the medical student, to the obstetrician, to the orthopædist and to those interested in the history of medical developments. But what is most important—it will now, for the first time, make the original text available in English, together with the lithographs of the original edition (as the author wanted them to be seen) reproduced by lithography in two colors.

Though the task was difficult and the result far from perfect "it seemed," as H. T. Lowe-Porter said in his translation of Thomas Mann's *Der Zauberberg*, "better that an English version should be done ill than not done at all."

Besides the detailed description of the pelvis studied, the author makes many interesting observations. His remarks on rickets and osteomalacia are priceless. His praise and criticism of some of his contemporaries are amusing and at times startling. He notes two types of dwarfs—but of course does not suspect that one has its etiology in an endocrine disturbance. He mentions the controversy then in progress as to Sigault's operation (Symphyseotomy). Nowhere is tuberculosis discussed though we feel that at least

in some of the many cases of extreme promontory of the sacrum, which Naegele says is often taken for an exostosis, Pott's disease with resulting curvature of the spine must have been the causative agent.

The author, Franz Carl Naegele, was born in 1778 in Düsseldorf, the son of Joseph, a teacher of Anatomy and Surgery in the Surgical Academy in that city. One paper only is known to have been published by Joseph Naegele and it was of little importance. Before the son, Franz, began his formal medical studies, he was prosector of Anatomy at the Surgical Academy at Düsseldorf. Later he studied at Strassburg, Freiburg and Bamberg, and, in 1802 matriculated as a physician. Shortly after graduation he brought about worth-while reforms in the institute for the poor in Heidelberg and published a report of these reforms in 1807. That same year he became professor extraordinary at Heidelberg of what would now be called gynecology and obstetrics. Three years later he became full professor and director of the Obstetrical Hospital at Heidelberg, and this position he held until 1851. From 1825 to 1847 he was also co-editor of *Heidelberger Klinische Annalen*, which from 1835 was named *Medicinische Annalen*.

Throughout his long and useful life of eighty years he continued to share the benefits of his experiences with his colleagues by teaching, writing and publishing. Little is known of his private life, although his medical career was full of helpfulness and honors.

It is the hope of its projectors that this centennial edition of the Naegele Pelvis may be considered as another and fitting tribute.

ALFRED M. HELLMAN, B.A., M.D., F.A.C.S.  
GEORGE MUSA, M.D.

New York, N. Y., August, 1938

## Preface

**A**LTHOUGH I had closely adhered to the *nonum pre-matur in annum*, it was nevertheless my intention only after further research, to go to work on my own publication of this subject which I had already discussed in a previous paper, ON A SPECIAL KIND OF MALFORMATION OF THE FEMALE PELVIS (*Heidelb. Klin. Annal.* Vol. X, No. 4). It had previously been my intention merely to fulfill my promise and to communicate to the readers of the Annals those further cases which had come to my knowledge. I thus intended to gain more time for intensive investigation and examination, and thought at the same time to wait for the opinion and views of those who are competent and experienced. But while pursuing my investigation, the work assumed an ever increasing interest for me so that I hoped to advance the subject by my own treatise. A monograph permits a wider distribution and is more inclined to attract the attention of the scientific world than contributions to a journal. I also found it necessary for a better understanding to add large size plates which would have been unsuitable for the form of a periodical. There is finally the golden rule;—"Do not put off for tomorrow what you can do today." These and similar reasons made me determined to abandon my first intention and to pursue the path I now follow. Solely with the intention to further the cause, I decided to publish the results of the investigations which I had conducted since 1834.

An unforeseen coincidence of favorable circumstances had given me the opportunity to compare a considerable number of malformed pelves. This is an indispensable

requisite for the proper understanding of the important peculiarities which characterize these pelves. Without the most minute examination of numerous specimens, without carefully comparing one with another, it is absolutely impossible to obtain a true picture, a clear perception of their mutual deformity. This publication will give many opportunities to justify this statement, in case it is not sufficiently apparent in the fact that experienced and able obstetricians after hours of careful examination have failed to discover one of the malformations though it was present in the whole group. It just happened to be more apparent in one or the other instance, depending upon the degree of distortion. Many keen observers with whom we had for years repeatedly spoken about it have also overlooked all those essential peculiarities which are missing in our drawings on the subject in our previous essay on the character of this deformity.

In order to obtain a correct conception of our deviations, it is very important to observe conscientiously and study carefully. It is obvious what incorrect conceptions would arise if after a superficial examination of one or two cases we would be induced to publish such pictures. Nothing but the most profound study can supply the examiner with the necessary knowledge without which he would only discover the more evident deformities. The evil consequences to which such defective and false representations give rise may be easily inferred. What erroneous conceptions and conclusions do they originate, to what misunderstandings and useless arguments do they lead,



how completely do they smother the true interest of the best, and what harm do they do to the rise and success of a good cause! Not less injurious, also, is a kind of active and industrious individual, parvenu in the world of literature, who is always on the alert, ready to sell every original new idea as his own by veiling it in a deluge of phrases or by disguising it by some trifling additions of his own. Persons of whom LEIBNITZ said in an article in an old chronicle (*Rer. brunsw.* T. III S. 646):

“To steal and rob is little shame  
The best are aptest in the game.”

Literary adventurers they are, pirates who infest the sea and compel the honest navigator to hasten the trip and bring his cargo into the first secure port without considering the profits which invite him elsewhere.

It did not matter to me, as far as the subject was concerned, who would publish this essay. However, I was fully aware of the man who, while the honest traveller uses his time, energy and life in order to reach the peak, gets hold of the traveller's skirt and is thus pulled upward because he is too lazy or lacks the energy to get there by himself. Once there he leaps on the shoulder of the tired student whose face is covered with perspiration and shouts, “I see further than you!” He could also be compared with the beggar who, being ashamed of the gift that he quickly slips into his pocket, turns around and looks proudly and insultingly at the donor just to make believe somebody else was the man who took the gift.

Certainly the omissions and defects in this publication would have been less numerous, had I been able to wait for complete termination of my investigations and for those notices, descriptions and specimens which have been promised to me. But I shall not forget to add conscientiously everything that will come to my knowledge and that time and strength will permit. I consider it a duty to repeat my wish that others may also publish those cases which come to their attention. I hope that this subject may receive the same attention in Germany that it has in other countries. Especially in Germany did this science of the deformity of the pelvis reach a height nowhere else attained. It is important enough to deserve this attention and I hope to prove this in the following pages.

It is understood that a more detailed description of the essential characteristics could have been suggested in the title of this special deformity that I intend to portray, but I do not fear that the chosen brevity may cause any misunderstanding. Obstetricians know the subject as I previously wrote about it.

It gives me pleasure to repeat my thanks to Doctors A. CHAVANNES, Lausanne; AL. CUNTZ, Herborn; C. KIRCHHOFFER, Kiel; C. MANDT, Rodenberg; EM. THIBAUT, Heidelberg; M. UNNA, Hamburg; V. WÜRZLER, Bernberg. With industrious energy they were kind enough to assist me in my research work and in measuring the pelves of the living subject and of the specimens.

*The Author*

HEIDELBERG, December 1837.



# Table of Contents

Preface of the Translators	iii
Preface of the Author	v
The Obliquely Contracted Pelvis	ix
Explanatory Remarks concerning the measurements used in this text	x
CHAPTER	PAGE
I. Introduction	1
II. Unusual Characteristics of Our Particular Species of Malformed Pelves	3
III. Description of all Obliquely Contracted Pelves which have come to the Author's knowledge	6
IV. Description of some Pelves similar to those previously mentioned	27
V. Frequency of the Obliquely Contracted Pelves	31
VI. On the Origin of our Pelvic Deformity	34
VII. On the Influence of Obliquely Contracted Pelves on Labor	36
VIII. Difficulty of Diagnosis	38
IX. Importance from the Practical Viewpoint	40
X. Suggestions and Proposals for Arriving at the Diagnosis of the Obliquely Contracted Pelvis in the Living	41

TABLE OF CONTENTS : *continued*

Appendix  
on the Most Important Deformities of the Female Pelvis

A. Description of the most Contracted Rachitic Pelvis ever known to impede labor	49
a. Description of the Case	49
b. Description of the Pelvis	52
Introductory Remarks to the following paragraphs	53
B. On the Differential Diagnostic Characteristics of the Contracted Pelves of Rickets and Osteomalacia	55
The most Contracted Pelvis following Osteomalacia ever described in the History of Obstetrics	56
C. On the Generally Contracted Pelvis, i. e., without deformity or malformation of the bones	58
D. The Pelvis Deformed by Exostosis	65
Explanation of the Plates	69

## **The Obliquely Contracted Pelvis**

Namely the pelvis contracted in the direction of one of the oblique diameters,  
with complete ankylosis of the sacro-iliac synchondrosis of one side, combined  
with imperfect development of the sacrum and os innominatum  
on the same side.



## Explanatory Remarks

### CONCERNING THE MEASUREMENTS USED IN THIS TEXT

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The old Paris foot or French foot (pied de roi) is the one used by the author throughout the text. It equals 32.48 cm, whereas the foot used by us today equals 30.48 cm.

The Paris foot is divided into 12 Zoll, or inches. The Zoll is shown thus <sup>''</sup> or by using the word inch.

One Zoll is divided into 12 Linien. The Linie is shown thus <sup>'''</sup> or by using the word line.

# I

## Introduction

**T**HIRTY-FOUR YEARS AGO I saw the first two specimens of that species of deformed female pelvis which comprise the subject of this treatise. A number of circumstances—the rare and very peculiar deformity of these pelves, the striking similarity with each other, those characteristics which differentiate them from the rachitic pelvis as well as the pelvis deformed as a result of malacosteon adultorum, and finally the sad ending of the deliveries—made me determined to pay more attention to a number of differences which are noted in Chapter III, Numbers 1 & 2. The recollection of these specimens was again vividly called to my mind in 1813 when I saw a pelvis which in all characteristics except one was similar to those two pelves. I was further reminded of these specimens in 1825 when I saw the description of the pelvis in the third volume of Lachapelles Memoirs. Unfortunately my desire to inspect large numbers of pelves and to look out for similar specimens remained unsatisfied for various reasons. But in 1828 I was pleasantly surprised to see a pelvis which was so similar to those two that there was hardly any difference between them. What had prior to this time been a vague idea now became a justified conception. I was convinced that there

was a common basic cause for this deformity which did not originate by accident and which could not be looked upon as a freak of nature. I had become deeply interested in the subject and I took every opportunity to discuss it with my colleagues. I collected information, requested examinations of collections, and tried in every way to progress in this new field of science and to bring light out of darkness. My endeavours were soon rewarded. I received verbal and written information of similar pelves and I was thus enabled to make comparisons. The next result was that I introduced those pelves as a *new, special* pelvic deformity at a meeting of the Society of Natural Science and Medicine on November 24, 1832.<sup>1</sup> I cited the reasons why, from the obstetrical viewpoint, I considered the knowledge of this species just as important as the knowledge of the rachitic or osteomalacic pelvis. I also submitted to that society those additional cases which had come to my knowledge. For nine years I have included this species in my lectures on pelvic deformities. I encouraged my students to watch for this deformity and to communicate with me when they encountered this species among pelvic collections in museums.<sup>2</sup>

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<sup>1</sup>*Heidelb. Jahrb. d. Lit.* 1832, Part 12.

<sup>2</sup>Vide Chapter III for the result. A great deal of my knowledge of these pelves which I described in my former paper and the discovery of those cases which I have learned about since 1834, I owe almost entirely to the laudable interest and zeal of

---

my pupils, to their love of science, and I am proud to say, to their devotion to me. In order, as far as my feeble powers will permit, to erect a monument to their love of science and to their spirit, I will show my sincere appreciation by mentioning the source of each case.

In consequence of the studies which my colleagues and I started with great energy, I increased, in a very short time, the number of known cases. I considered it my duty to submit the result to a larger medical forum in a treatise, *On a special kind of female pelvic deformity—(with four lithograph plates)*.<sup>3</sup> I also did not cease to call my colleagues' attention to this subject in a paper which I read at a meeting of the medical section of the Congress of Natural Scientists and Physicians in Stuttgart on September 23, 1834.

At first it was my intention to fulfill the promise that I had given in this paper to those who are interested in this subject, namely, to publish those cases of which I had learned since 1834. But as I indicated in the preface I was

induced to change my mind and to publish the results of my research work at this time in a special treatise. In the following I have not only described the character of this deformity, its frequency and importance as outlined in my former paper, and presented those cases which I studied and collected since 1834 but I have also attempted to describe in greater detail what I formerly merely mentioned. I have tried to discuss more precisely what I merely visualized. This will be evident to everyone who compares the following characteristics with those contained in the former paper. I tried especially to give a correct and accurate picture of this pelvic deformity to those who have never seen it.

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<sup>3</sup>Heidlb. *Klin. Annalen*, Vol. 4, Part 3, p. 449. Translated in the *London Med. and Surg. Journal*, Vol. VII, No. 168; the *Gazette Med. de Paris*, Vol. 3, No. 2; and other journals.



## II

### Unusual Characteristics

#### OF OUR PARTICULAR SPECIES OF MALFORMED PELVES

The special characteristics of our species of pelvic deformity are principally the following:

(1). Complete ankylosis of the sacro-iliac symphysis or a complete fusion of the os sacrum with the os ilium on one side.<sup>1</sup>

(2). Arrest or imperfect development of the lateral part of the os sacrum and a narrower lumen of the foramina sacralia anteriora on the ankylosed side.

(3). Narrowness of the os innominatum and of the sciatic notch<sup>2</sup> on the same side. The distance between the spina anterior superior ossis ilii and the spina posterior superior is diminished as shown by a line, linea ileo-pectinea, at the pelvic inlet drawn from the symphysis sacro-iliaca along the linea innominata and the pecten ossis pubis to the symphysis pubis. This line is shorter than on the corresponding bone of the opposite side.

That portion of the posterior part of the inner

surface (the *superficies auricularis* of the normal bone) of the iliac bone that connects this bone with the os sacrum is found to be shorter than on the opposite or a normal os ilium. To clarify this, let us imagine a separation of the ankylosis of the os ilium and the os sacrum and picture them connected with each other by a fibro-cartilaginous disc (as in the normal state). We would then find the connected surface of both bones shorter than in the normal pelvis and shorter than the opposite side.

(4). The os sacrum appears pushed towards the ankylosed side to which its anterior surface is somewhat rotated. At the same time the symphysis pubis is forced towards the opposite side. The symphysis thus faces the promontory obliquely.

(5). On the side of the ankylosis, the inner surface of the lateral wall and of the lateral part of the anterior wall of the pelvis is found less hollow and flatter than

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<sup>1</sup>We use the word ankylosis only on account of its brevity and usefulness in order to name the above described special characteristic. We state explicitly that we do not mean that those two bones originally had been well formed and subsequently became diseased and fused together. Synostosis or synezeis are possibly better names for this fusion.

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<sup>2</sup>We, often in this treatise, used the well known Latin names in order to be readily understood by those who, though knowing the German language, might not be familiar with the German anatomical nomenclature. We considered this a duty since great interest in this subject was aroused in France and England.

in the normal pelvis.<sup>3</sup> This lateral part of the anterior pelvic wall and the horizontal ramus of the os pubis never curves inward in this species of pelvis as it does in the osteomalacic pelvis.

(6). The other half of the pelvis, that on which the synchondrosis sacro-iliaca exists, likewise deviates from the normal.

At first our pelvises, especially those with a less pronounced deformity, are deceiving. We could be tempted to believe that this half of the pelvis is normal. This, however, is not the case. If one divides a pelvis that shows an ankylosis of the left sacro-iliac synchondrosis by a perpendicular line through the middle of the os sacrum and the os pubis, and connects the right part of this pelvis with the left part of a pelvis that has its ankylosis on the right side and shows, otherwise, the same measurements throughout, one would find when the cut surfaces of the sacral bones are connected, that the pubic bones are separated from each other by three to four inches. That half of the pelvis showing no ankylosis shares its fate with that afflicted with the ankylosis not only by abnormal position or direction of the bones but by a faulty form. A line drawn on this side from the middle of the promontory to the symphysis along the linea innominata of the os ilium and the pecten ossis pubis is less curved on its posterior surface and more on its anterior as compared with the normal pelvis.

The consequences of the foregoing sections 2-6 are:

(7). *a* This pelvis is obliquely contracted, i.e., in a

diameter which crosses that other diameter extending from the ankylosis to the opposite acetabulum. The latter diameter is not diminished but in the greater degrees of distortion it is often increased.

Consequently the pelvic inlet (a plane bounded by an imaginary line drawn through the crests of both pubic bones and along the linea innominata of the iliac bones to the os sacrum) and also another imaginary plane in the middle of the pelvic cavity, where we picture the apertura pelvis media, are both seen from the front as similar to an obliquely lying oval. The small or transverse diameter of this oval corresponds to the diminished oblique diameter of the pelvic inlet and the pelvic cavity. Its larger or longitudinal diameter corresponds to the other oblique diameter.<sup>4</sup> In order to designate these pelvises precisely according to their form I suggest the name *pelvis oblique-ovata*, *bassin oblique-ovalaire*.

*b* The *distantia sacro-cotyloidea*,<sup>5</sup> the distance between the promontory and the region above both acetabula, is shorter on the ankylosed side than on the opposite side. The same is the case with the distance between the apex of the os sacrum and the two ischial spines.

*c* On the ankylosed side, the distance between the tuber ischii and the spina posterior superior ossis ilium of the other side and that between the spinous process of the last lumbar vertebra and the spina anterior superior ossis ilium of the ankylosed side are

<sup>3</sup>To make this better understood: The os innominatum of the ankylosed side is, as far as it contributes to the formation of the pelvic cavity, flatter on its inner surface. In a greater distortion it is almost even. A line drawn from the posterior part of the linea innominata and continued along the body and the horizontal ramus of the pubic bone to the symphysis pubis is found to be almost straight.

<sup>4</sup>It is obvious that lines drawn in the oblique pelvis between those points which mark the straight and transverse diameter of the normal pelvis do not cross at right angles. In this pelvis we cannot speak of a straight and a transverse diameter as in the symmetrical pelvis.

<sup>5</sup>We shall use this designation for that distance which J. BURNS, previous to VELPEAU, considered necessary to measure in order to get an accurate conception of the pelvic inlet. Since Velpeau (*Tocologie*, T. I, p. 16) claims that he was the first to point out this distance and wonders why no one before him had

ever thought of it ( "étonne que personne n'en ait eu la pensée"), it appears so much more astonishing as he mentions Burns on the same page (certainly for another purpose—to find fault with him). As incorrect as this claim of Velpeau is, so improper is it to name this distance a diameter, which it is not, and which Burns did not call it. Burns before Velpeau did not only realize the importance of and describe the sacro-cotyloide distances but he surpassed Velpeau by describing that important line of the anterior part of the pelvic inlet that connects their two anterior points. This leads us to the assumption that the careful author of *Tocologie* either allowed himself to quote at second hand or did not thoroughly read those books to which he refers—a supposition which only too often is forced upon the experienced reader of this industrious collector of quotations. According to the measurements made by my friend, Prof. STOLTZ of Strassburg, on forty and by myself on fifty-four well formed pelvises the average of the *distantia sacro-cotyloidea* was found to be three inches and three to four lines. (The Paris foot or Pied de Roi, is the measure we use in this work.)

smaller than the same distance on the opposite side.

*d* The distance between the inferior edge of the symphysis pubis and the spina posterior superior ossis ilium is shorter on the ankylosed than on the opposite side.

*e* The walls of the pelvic cavity converge downward to some extent. The pubic arch is more or less contracted on account of the misdirection of that ramus which faces the flattened pelvic wall and so approaches the form of the male pelvis. Both these conditions combined with the contraction of the sciatic notch, the diminished distance between both ischial spines, the unilateral imperfect development of the sacrum are found in proportion to the degree of distortion.

*f* The acetabulum on the flattened side is directed more forward than in the normal pelvis. On the other side the acetabulum is directed almost completely outward. If one views the pelvis anteriorly the eye sees directly into one acetabulum while only a small part of the cavity of the other acetabulum is visible.

In order to give a correct picture to those who have never seen pelves of this kind we may add: The first impression of these pelves is as if they were distorted by pressure acting in an oblique direction—from without inward and from below upward—on the lateral part of the anterior pelvic wall and on the acetabulum. The other half of the pelvis appears to have had its posterior wall pressed from without inward.

It is another peculiarity of these pelves that they only differ from one another in the degree of distortion and the side of the ankylosis. Otherwise they resemble each

other—as one egg resembles another—in all the main characteristics of the deformity. This is so pronounced that an obstetrician who is not aware of it—if he has anywhere seen such a pelvis and afterwards happens to see one of the same kind in another place—is led to believe it to be the same that he has seen before. It may be quite difficult to convince him of his error, as we will later show. The condition of the bones of these pelves—apart from their above described deformities—their thickness, size, firmness, texture, color, etc., is the same as found in healthy individuals. These bones in particular show no marks of rachitic or osteomalacic disease, neither in form nor in any other quality. The deformities removed, the majority of these pelves would be well built and medium in size. In none of those cases of which we have an intimate knowledge were any signs of a rachitic habitus present. We never found any pathological changes as found in osteomalacia. There was never a sign of an external force or injury such as a fall, pressure or a blow. Pains in the lumbar region, in the pelvis or in the lower extremities never had been encountered. In none of those cases which we knew intimately did any limping exist. A slight limping, we thought, was noticeable on one patient whom we closely watched while walking. Other obstetricians, however, who were present during the examination did not share our opinion. Neither did the parents and relations of this patient admit that they had ever noticed any limping.

On two of our pelves in which the lumbar vertebræ were present, the lumbar vertebral column was straight; in the other it was curved towards that side that is free from ankylosis. In all our pelves with lumbar vertebræ the anterior surface of the bodies of those vertebræ is somewhat rotated towards the ankylosis.



# III

## Description

### OF ALL OBLIQUELY CONTRACTED Pelves WHICH HAVE COME TO THE AUTHOR'S KNOWLEDGE<sup>1</sup>

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#### A. Female Pelves

##### Nos. 1 & 2

I saw the first two examples in 1803 in the possession of a friend and colleague in Germany. He himself had taken care of one of the cases, a healthy, strong, primiparous peasant of medium stature, nineteen years old. Except for the diseases of infancy, she had always been healthy and everything appeared to promise a normal delivery. The doctor was consulted twenty-two hours after the membranes had ruptured and thirty-six hours after the onset of pains. He informed me that he found the head still pretty high and above the pelvic inlet though the pains after the rupture of the membranes had been regular and strong. He applied forceps though this was found to be very difficult. After the forceps had slipped several times, he was finally able to get a good grip on the head which, nevertheless, did not advance. He consulted another colleague and after alternating attempts and using all their

power they finally delivered the baby. The child was dead and there was a considerable hæmatoma on the head. The woman died four days later of pelvic inflammation. On the left side this pelvis did not show any trace of a sacro-iliac synchondrosis. The left part of the sacrum showed imperfect development. The left oblique diameter of the inlet measured 4" 5"', the right diameter only 3" 4"'. The symphysis pubis was pushed to the right. The left part of the anterior pelvic wall was flatter and the pubic arch narrower than in the normal pelvis.

The other pelvis which he had received from his uncle who also was a physician was very similar to the first with the exception that the left oblique diameter measured 4" 7"', the right only 3". The inner surface of the os innominatum, as far as it formed a part of the pelvic cavity, was much flatter and the pubic arch narrower than in the former pelvis. He knew nothing about the history except that this was the pelvis of a young primipara who died twenty-four hours after craniotomy was performed.

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<sup>1</sup>I open this series with those specimens, No. 1-No. 9, which I described in 1834 in the afore-mentioned paper: "On a special kind of faulty developed female pelvis."

The third case occurred in my own practice in 1828.

Gertraud A-n of F-I in Bavaria was a brunette of medium stature, nineteen years old, unmarried, healthy, slender and apparently well built. While closely watching her walk, we believed we noticed a slight limp as if the left leg was somewhat shorter than the right. But others who were present during the examination as well as parents and relatives did not share this opinion and assured me that they had never noticed any limp.

She always was in the best of health, in good spirits, and loved to dance. She lived a simple life and from childhood on lived an out-door life. She lived in a healthy, beautiful country and was never forced to do any heavy work and never had to exert herself. Her parents were both healthy; her brothers and sisters were also healthy and strong. Her mother was well built and had had twelve normal deliveries in fifteen years. Her father and one of her brothers were rather tall. Physicians, on examining this brother for fitness for military service, found the right hip to be higher than the left hip and therefore, ordered him to the "wagon train" service. The girl had menstruated since she was sixteen years of age. For the last year she had lived a rather loose life and was at term in her first pregnancy.

The BAUDELOCQUE diameter was a good seven inches. The external examination was otherwise rather unsatisfactory as the patient was quite obese. The vaginal exploration revealed that the head was not in the pelvis, as in other primiparæ, but high and easily movable. On account of this finding, I paid special attention to this case and made a more complete examination. The promontory could not be reached with one or two fingers.

The membranes ruptured two days before the onset of pains. On the first day the pains were weak; on the following day they were much more painful than strong and not continuous. Only on the third day of labor, with the head deep enough in the pelvic inlet and the small fontanelle to the left anteriorly, was it considered safe enough to apply the forceps. The artificial delivery with this instrument proved extremely difficult and required such force that we later regretted not having performed a craniotomy. The placenta was retained by a spasm of the uterus and a

hæmorrhage necessitated manual removal of the placenta one hour after delivery.

The child, a dead boy, weighed seven pounds. His face was black and blue, and swollen. The abdomen showed signs of decomposition. At the autopsy the vessels of the dura mater and the sinuses were found to be overfilled with blood. There was no extravasation into the brain. The ventricles contained little serum. There was much serum in the pericardium and the pleural cavity.

On the following day the patient showed symptoms of puerperal fever accompanied by diarrhœa. On the fifth day after delivery the patient died. The autopsy showed nothing unusual in the skull or chest except for old pleural adhesions. In opening the abdomen, the intestines were found completely covered by the omentum. The uterus was the size of a newborn foetal head and exteriorly showed nothing unusual except that its right angle was on a higher level than the left. The cut surface also showed nothing unusual. The inner surface and the vagina looked normal. The region of the right ligamentum latum, of the right ovary, and the right tube showed marked inflammatory signs. All these parts were swollen, red, and their vessels markedly injected. A large quantity of the usual straw-colored puerperal exudate was found in this region, partly coagulated and partly in liquid form.

#### *Description of the Pelvis*

At first glance this pelvis shows all characteristics of the pelvic deformity which we described in the preceding chapter. Apart from this deformity, the pelvis would appear as one of a young person, of moderate measurements, well built, normal in relation to strength, firmness, texture and color of the bones. The degree of distortion is not especially great. The weight of the bony pelvis together with the last three lumbar vertebræ is seventeen ounces, three and a half drachms. The os sacrum and the left iliac bone are not united by means of an intermediate cartilage. These two bones are completely fused together. There is no trace, anteriorly or posteriorly, of any former separation. Both bones appear completely as one. There are a few small and very insignificant elevations in the upper part of the region of the synchondrosis. Only he who knows that a symphysis is usually found at this spot would consider these elevations as remnants of it.

### *The Os Sacrum*

The os sacrum is composed of four and the coccyx of six vertebræ. The former is pushed somewhat to the left while the symphysis ossis pubis is pushed to the right. The anterior surfaces of the os sacrum and of the bodies of the lumbar vertebræ are turned somewhat to the left. The height of the os sacrum, from the promontory to its apex, measures 2''11''', the length of the coccyx 1''10'''. The distance from the promontory to the apex of the coccyx measures 4'' 3'''. The left half of the os sacrum is altogether narrower and less perfectly developed than the right half. The foramina sacralia anteriora are also somewhat smaller on the left side than on the right. The distance, from the right symphysis sacro-iliaca to the point on which it would exist—were it developed—on the left side, measures 3''4'''. From this point on the left side to the middle of the promontory, the measurement is 1''4'''—from the latter point to the symphysis sacro-iliaca dextra, it is 2'' 2'''. These three points do not lie in a straight line and that is the reason for the fact that the sum of the last two measurements is not equal to the first mentioned dimension. The concavity of the anterior surface of the os sacrum from above downward is normal.

*The Ossa Innominata*

The ossa innominata show a remarkable asymmetry at first glance. The left os innominatum appears pushed upward and inward, thus raising the crest of the ilium, the acetabulum and the tuberositas ischiæ on the left side. The left spina ischii is higher and more posterior than on the right side. Its distance from the transverse process of the first coccygeal vertebra measures 9''' compared to 1'' 9''' on the other side. The ala, the wing-like portion of the left os ilium, rises more abruptly and so forms a larger angle with the horizontal plane.

A line drawn from the middle of the linea innominata of the left os ilium behind and along the body and the ramus transversus of the left os pubis to the symphysis ossis pubis is approximately a straight line. The distance between the left spina anterior superior and the spina posterior superior is 5" 7''' as compared with the right of 5" 10'''.

The distance between the promontory and the spina

anterior superior is 3" 11½" on the left side in contrast to 5" 4" on the right side. The distance between these two spines measures 8" 3".

### *The Inlet of the Pelvis*

The inlet of the pelvis, properly speaking, a plane bounded by an imaginary line drawn along the crests of both pubic bones and along the linea innominata of both iliac bones continued to the os sacrum, is an obliquely lying oval, extending from the left posteriorly to the right anteriorly. Its smaller end is formed by the region of the left symphysis sacro-iliaca, its larger by the body and transverse ramus of the right pubic bone.

Diameter obliqua sinistra	4" 7"
Diameter obliqua dextra	3" 5"
From the middle of the promontory to the region above the left acetabulum or	
Distantia sacro-cotyloidea sinistra	1" 10"
Distantia sacro-cotyloidea dextra	3" 6"
From the middle of the promontory to the upper edge of the symphysis ossis pubis (lying in oblique opposition to it)	3" 9"

A line drawn through the middle of the articular surface on the base of the os sacrum<sup>2</sup> and continued anteriorly, cuts the left os pubis at the point on which its horizontal ramus meets its descending ramus (at a distance of one inch from the middle of the upper edge of the symphysis ossis pubis).

A plane in the middle of the pelvic cavity, usually called the middle aperture, is similar to the one in the inlet.

From the middle of the hollow of the os sacrum to the middle of the symphysis pubis	4" 4'''
From the region of one cotyloid cavity to the other, or the distance which corresponds in the normal pelvis to the transverse diameter	3" 11'''
From one spina ischium to the other	2" 11½'''
At the outlet from one tuber ischii to the other	3"
From the apex ossis sacri to the inferior edge of the symphysis pubis	4" 4'''

<sup>2</sup>In order to prevent any misunderstanding I should like to add that this line coincides with the small diameter of the

oval of this articular surface or that it cuts this surface at a right angle.



*(Plates IV and V)*

This pelvis and the one described in No. 5 were discovered by my son, Dr. HERMAN FR. NAEGELE, the first one in 1834 in a collection of the Hospice de la Maternité of Paris. The case, which is also mentioned—though very briefly—in the memoirs of LACHAPELLE, Part III, presented itself in this hospital in 1822. My friend, the Hon. Dr. CHAMPION of Bar-le-Duc, who happened to be in Paris at that time observed the case and gave the following description:

A woman, a primipara, 20 years of age, tall, apparently well built, was admitted to the hospital after having been in labor for four days, forty-eight hours after the rupture of the membranes. While a craniotomy was performed, the patient died undelivered. The description of the pelvis which follows is in accordance with observations made by my son on the original and on a plaster cast which he had made and sent to me.

The ankylosis of the symphysis sacro-iliaca, the unilateral imperfect development of the os sacrum, etc., are also found on the left side of this pelvis. The symphysis pubis is pushed to the right, the os sacrum to the left. It is distorted to a far greater degree than those specimens already described.

The os sacrum consists of five vertebræ. Its anterior surface is only slightly concave from above downwards. Its height from the promontory to the apex is 4", its greatest width 2" 10"". From the middle of the promontory to the symphysis sacro-iliaca dextra 2" 2½", and to the point on which the left symphysis is assumed to exist 1" 1"". The imperfect unilateral development of the os sacrum is more pronounced than on most pelvis known to us. On the left side there is no trace of any processus transversus of the first three sacral vertebræ. The body of the first sacral vertebra continues into the left os ilium. The place of the fusion is smooth throughout—there is no trace of a once existing separation. "Tous deux," says the Hon. Dugès in his note on this specimen, "sont unis, non par une symphyse, mais par une ossification très solide et sans traces d'articulation ou de cicatrice." The foramina sacralia anteriora of the left side are very much smaller than on the right side. The distance between the spina anterior superior

and the spina posterior superior on the left side is 5" 3""; on the right side 6".

The distance between the spina ossis ischii and the apex ossis sacri on the left side is 1", on the right side 2" 4"".

The distance between the middle of the promontory to the spina anterior superior is 2" 11"" on the left side; 5" 5"" on the right side. The distance between these two spinæ measures 7" 5"".

*The Inlet of the Pelvis*

Diameter obliqua sinistra	5" 1""
Diameter obliqua dextra	3" 1""
Distantia sacro-cotyloidea sinistra	1" 6""
Distantia sacro-cotyloidea dextra	3" 11⅓""
From the promontory to the symphysis pubis	4" 3""

A line drawn through the middle of the articular surface on the base of the os sacrum to the anterior part of the pelvis cuts the left os pubis at a point where its body continues into the ramus transversus.

*Cavity of the Pelvis*

From the point of union of the second and third sacral vertebræ to the middle of the symphysis pubis	4" 8""
From one acetabulum to the other	3" 6""
From one spina ischii to the other	2" 3""

*Outlet of the Pelvis*

From the apex ossis sacri to the lower edge of the symphysis pubis	4" 8""
From one tuber ischii to the other	2" 10""

The direction of those two lumbar vertebræ which were still attached to the pelvis indicated that the vertebral column in the lumbar region must have had a slight curvature to the right. The body of the last lumbar vertebra was found somewhat lower on the right than on the left.

In order to avoid any repetition we shall describe in No. 22 whatever additional information we have received in regard to this case.

## No. 5

This specimen was seen by my son in 1833 in the Pathological Museum of the General Hospital in Vienna. It was the pelvis of a woman, twenty-three years old, who

died in labor in the obstetrical department of this hospital in 1819 after a rupture of the uterus and vagina.

This pelvis differs from those previously described in that the malformation exists on the opposite side. The os sacrum is pushed to the right, the symphysis pubis to the left. The os sacrum is fused with the right iliac bone which is malformed and imperfectly developed. The ankylosis is perfectly smooth anteriorly, posteriorly and below. Above there is a slightly elevated ridge indicating a symphysis but running in a different direction. The os sacrum consists of five vertebræ. The pelvis is distorted in a higher degree. The left acetabulum shows distinct traces of a former cox-arthritis. According to the autopsy report the left femur was found thinner and 3" shorter than the right. The femur was also elevated and adducted. The trochanter was higher than normal. The whole shaft was curved to the right.

#### *The Inlet of the Pelvis*

Diameter obliqua dextra	4" 10'''
Diameter obliqua sinistra	3" 2'''
From the promontory to the symphysis pubis	4" 2'''

#### *The Cavity of the Pelvis*

From the middle of the hollow of the sacrum to the middle of the symphysis pubis	3" 9'''
From one acetabulum to the other	3" 1½'''
Distance from one tuber ischii to the other	2" 8'''

#### No. 6

I owe the knowledge of this and of the following pelvis to my esteemed friend, Dr. VON DOUTREPONT who was kind enough to send them to me for further examination and for the purpose of publication.<sup>3</sup> One of these pelves (marked with the letter E on the inner surface of the left iliac bone) consists of the os sacrum, the two ossa innominata and the

last lumbar vertebra which is fastened to the pelvis by means of wires. The missing cartilage of the symphysis pubis is replaced by a piece of leather. The pelvis—according to its original formation—is of less than medium size. The degree of distortion is not very pronounced.

The fusion of the os sacrum and the iliac bone, the unilateral imperfect development of the os sacrum, etc., exist on the left side.

The os sacrum consists of five vertebræ. Its anterior moderately curved surface and the anterior surface of the body of the last lumbar vertebra are turned somewhat to the left. From the promontory to the apex 3" 6". The width of the os sacrum or the distance from the right symphysis sacro-iliaca to the point on which it ought to exist on the left side is 3" 2". From this point to the middle of the promontory 1" 3". From the latter point to the right symphysis sacro-iliaca 1" 11". The left part of the os sacrum is imperfectly developed in its entire length. The foramina sacralia anteriora of the same side are smaller than those on the other side. The canalis sacralis is open posteriorly as far as it is formed by the arches of the first, second, and third sacral vertebræ. The edges of the arch of the fourth vertebra are in contact with each other. The synostosis of the os sacrum and the iliac bone is complete. It has the same aspect as described before. It is smooth throughout. Only above the pelvic inlet there is a slight prominence, not rough or uneven—corresponding in its direction to the symphysis usually found at this point.

The distance between the spina anterior superior and the spina posterior superior is 4" 11" on the left, 5" 6" on the right side.

From the middle of the promontory to the spina anterior superior of the left iliac bone 3" 8", to the spina anterior superior of the right iliac bone 5" 1". The distance between these two spines is 7" 7".

<sup>3</sup>When I met this esteemed physician, who with great zeal follows every scientific problem, at a meeting of German Natural Scientists and Physicians in the autumn of 1829 I showed him in the presence of my esteemed friends Dr. MAPPE of Frankfurt and Dr. NEBEL of Heidelberg the pelvis just described and that to be described later (S IV, No. 1) and also a description of the specimens No. 1 and 2. I, also, showed him the notes and information on similar pelves and revealed the reasons for my convictions that these pelves form a special

class of deformity and that they deserve the same attention from obstetricians as the other malformations of the pelvis. I expressed the desire to obtain further specimens of this class of whose existence I was fully convinced. He readily promised to search for them. Later, in 1831, he was kind enough to send me those two specimens for publication purposes. I here wish to repeat my deepest appreciation which I expressed before in an earlier paper (1834).

### *The Inlet of the Pelvis*

Diameter obliqua sinistra	4" 4'''
Diameter obliqua dextra	3" 4'''
Distantia sacro-cotyloidea sinistra	2" 1½'''
Distantia sacro-cotyloidea dextra	3" 3½'''
From the promontory to the symphysis pubis	3" 8'''

A line drawn through the middle of the articular surface of the base of the os sacrum anteriorly cuts the left pubic bone at the point on which the ramus transversus continues into the ramus descendens.

### *The Pelvic Cavity*

From the union of the second and third sacral vertebræ to the middle of the symphysis pubis	4" 1'''
From the left to the right acetabulum	3" 6'''
From the left to the right spina ischii	2" 8'''

### *The Pelvic Outlet*

From the apex ossis sacri to the lower edge of the symphysis pubis	4" 3'''
From one tuber ischii to the other	2" 10'''

I was told that nothing was known about the case except that it was a primipara who had died after artificial delivery.

### No. 7

#### *(Plates VI and VII)*

This very carefully prepared specimen consists of all the bones of the pelvis, the last two lumbar vertebræ and about three inches of both femurs which have not been presented in the plates. The synostosis of the iliac and sacral bone and the imperfect development of the latter are found on the right side. This pelvis belongs to those of our species which are distorted to a greater degree.

The sacrum consists of six vertebræ. Its anterior surface is almost flat from the promontory down to the union of the last two vertebræ. Its right half is remarkably imperfect in development. The transverse processes of the first three sacral vertebræ are missing and their free edges are also imperfectly developed. The iliac bone appears continuous with the bodies of the first and the upper part of the second sacral vertebræ. The foramina sacralia anteriora are much smaller on the right side. The anterior surface of

the os sacrum and the anterior surfaces of the bodies of the lumbar vertebræ are rotated to the right. The base of the os sacrum is also rotated to the right, its apex and the os coccyx to the left. The height of the os sacrum is 4" 2''' from the promontory to the apex, 4" 8''' to the apex of the os coccyx. From the left symphysis sacro-iliaca to the point on which it ought to exist on the right side 3" 2''' . From the middle of the promontory to this point 1" 3''' , to the left symphysis sacro-iliaca 2" 4''' .

The region of fusion between the os sacrum and the right iliac bone is flat and smooth anteriorly, posteriorly, and below. It feels polished. Above, at the distance of 5''' from the articular surface on the base of the os sacrum, a very slightly raised elongated prominence is to be seen. This is not rough and runs in the antero-posterior direction. Nobody would consider this as remnants of a former separation except one who knows that it usually exists at this point.

The width of the right iliac bone from the spina anterior superior to the spina posterior superior is 5" , the width of the left is 5" 7''' .

The crista of the two iliac bones is still epiphysis.

From the middle of the promontory to the spina anterior superior is 3" on the right side. The corresponding measurement on the left side is 5" . The distance between the two spinæ is 7" 3''' .

### *The Inlet of the Pelvis*

Diameter obliqua dextra	4" 5'''
Diameter obliqua sinistra	3" 2'''
Distantia sacro-cotyloidea dextra	1" 10'''
Distantia sacro-cotyloidea sinistra	3" 8'''
From the promontory to the symphysis pubis	4"

A straight line drawn through the middle of the articular surface on the base of the os sacrum anteriorly cuts the right pubic bone at the point at which the body continues into the ramus transversus.

### *The Cavity*

From the point of union of the second and third sacral vertebræ to the middle of the sym- physis pubis	4" 2'''
From one acetabulum to the other	3" 6'''
From one spina ischii to the other	2" 6'''



### *The Outlet*

From the apex ossis sacri to the lower edge of the symphysis pubis	4" 2'''
From one tuber ischii to the other	3"

The body of the last lumbar vertebra is almost half as high on the left side as on the right. Judging from the direction of these two lumbar vertebræ which are still attached to the pelvis the vertebral column is curved to the left.

On October 7th, 1831, the owner of this specimen wrote to me all that he had ascertained about the case. The pelvis belonged to a twenty-year-old primipara. BRUENINGHAUSEN and CARL CASPAR SIEBOLD (the two priests of Chiron and Ilithyia Mogostocos) had tried in vain to apply the forceps. Later they had perforated the head but they had been unable to extract the head even by means of the hook. The woman had died undelivered.

### No. 8

The two pelves which are next described were discovered by my friend and former pupil, Dr. JOH HEINR. MENKE of Bremen in the museum of the Hospital di Sta Caterina near Milan. MENKE, a young physician outstanding in spirit and knowledge, had devoted himself to the study of obstetrics for several years. He was especially interested in the study of malformed pelves and also our special kind of deformity. To his great delight he had discovered—as he wrote me on May 13th, 1831—two pelves which resembled each other and also a third pelvis (described under No. 3) which he had seen with me and very often carefully examined. They resembled one another so completely in all peculiarities of deviation from the normal form that after having examined one of them very thoroughly he could not refrain from asking Professor FELICE BILLI, director of the Lying-in Hospital, whether he had possessed this pelvis a long time. It was hard for him to believe that this was not the same pelvis which he had studied with me not long ago.

Dr. CARLO PIANTANIDA, Direttore dell' Ospedale Maggiore, e Dei Luoghi Pii Uniti at Milan, was later kind enough to send me an exact description and a drawing of both pelves through Dr. MARCHI GHERINI. I consider it a pleasant duty to repeat publicly my thanks to these esteemed men.

Concerning one of these pelves (marked No. 24 in that collection) the detailed description by Dr. PIANTANIDA and also the drawing prove the complete resemblance which MENKE found to exist between this pelvis and the one described under No. 3. Only in comparing diameters, this pelvis proved to be distorted to a greater degree than mine. The left oblique diameter is somewhat larger in the former, the right somewhat smaller in the latter pelvis. The imperfect development of the left side of the os sacrum is more pronounced as is the difference in the size of the foramina sacralia anteriora between the two sides of the pelvis. Judging from the last three lumbar vertebræ which were attached to the pelvis, the vertebral column in the region of the lumbar vertebræ was curved to the left.

### No. 9

The other specimen, marked 23 in that collection, is distorted in a higher degree than the one just described. The ankylosis of the symphysis sacro-iliaca, the unilateral imperfect development of the os sacrum, etc., are on the right side.

Diameter obliqua dextra	4" 6'''
Diameter obliqua sinistra	2" 10'''
Distantia sacro-cotyloidea dextra	1" 8'''
Distantia sacro-cotyloidea sinistra	3" 1'''
From the promontory to the symphysis pubis	3" 9'''

A line drawn at the upper aperture from the region of the ankylosis along the linea innominata of the iliac bones and continued behind the body and the ramus transversus of the pubic bone to the symphysis pubis is nearly straight on both pelves. (*Descriva una linea quasi retta*). Dr. PIANTANIDA expressly remarks that the ankylosis of the symphysis sacro-iliaca is complete in both pelves.

ROUX mentions these two pelves in his report of his trip to Italy which he gave, right after his return, at the meeting of The Academie Royale de Médecine on December 7th, 1834. This experienced and honorable surgeon chose those two obliquely contracted and ankylosed pelves from a large variety of deformed pelves which he found in the collection at Milan. He pointed out as of particular practical importance that a symphysiotomy would in these cases not have been able to remove the os innominatum of the ankylosed side. He called attention to this fact in a former

paper. Those who are interested in this special subject can only regret that the reference of ROUX's report in relation to this fact—as contained in the French Medical Journals—is not presented by one more familiar with obstetrics.

No. 10  
(Plate III)

The pelvis to be described is contained in the rich collection of my friend, the esteemed Professor GERH. VROLIK of Amsterdam—a collection that demonstrates the zeal, spirit and knowledge of its owner. My former pupil, Dr. MORITZ UNNA<sup>4</sup> of Hamburg, discovered it in this collection and VROLIK was kind enough to leave him this specimen for further examination and description. The following is the description which this competent expert of the pelvis made and sent to me in February, 1836.

“The bones of this pelvis show all characteristics of perfectly healthy bones of a young person. Attached to this pelvis are the three last lumbar vertebræ of which the two upper are directed backward. All three are rotated from right to left, in the direction from above downward. The ankylosis of the symphysis sacro-iliaca is found on the left side and shows no trace of a former synchondrosis. This fact principally led VROLIK to his idea of the origin of this deformity which I shall mention later.

“The os sacrum consists of five vertebræ. Its base is directed to the left, its apex to the right. Its height from the promontory to the apex is 3" 6". The left half is considerably less developed. The foramina sacralia anteriora on this side are smaller and narrower. From the middle of the promontory to the right symphysis sacro-iliaca 1" 11", to the point where it should exist on the left side 1".

*“The Ossa Innominata*

“The left lateral wall and the left half of the anterior wall of the small pelvis are flattened as in the other pelves of this kind in your collection. The symphysis ossis pubis is pushed to the right, in oblique opposition to the promon-

tory. The ramus descendens of the left pubic bone stands backward compared with the right pubic bone. The same condition applies to the left tuberositas ischii compared with the right one. The arcus pubis is almost of the male type. The ala of the left iliac bone rises almost perpendicularly, the right one shows the usual inclination.

From the spina anterior superior to the spina posterior superior on the right ilium	5" 8"
From the spina anterior superior to the spina posterior superior on the left ilium	5" 2"
Width of the right incisura ischiad major	1" 8"
Width of the left incisura ischiad major	1" 3"
From the middle of the promontory to the spina anterior superior of the left iliac bone	3" 2½"
From the middle of the promontory to the spina anterior superior of the right iliac bone	5" ¼"
Distance between the two spinæ	6" 7¾"

“The further dimensions which appear of importance for you are the following:

*“At the Inlet*

Diameter obliqua sinistra	4" 6"
Diameter obliqua dextra	3"
Distantia sacro-cotyloidea sinistra	1" 9"
Distantia sacro-cotyloidea dextra	3" 4"
From the promontory to the symphysis pubis	3" 11" <sup>5</sup>

*“In the Pelvic Cavity*

From the union of the second and third sacral vertebræ to the middle of the symphysis pubis	4" 6"
From one acetabulum to the other	3" 5"
From one spina ischii to the other	2" 7"

*“At the Outlet*

From one tuber ischii to the other	2" 10"
From the apex ossis sacri to the lower edge of the symphysis pubis	4" 9"

<sup>4</sup>The author of the paper which was awarded a prize by the Heidelberg Medical faculty “De tunica humoris aquei commentatio anatomico-physiol. et pathologica etc. c II in lap. incis” (Heidelb. 1836), was a talented young man, with the warmest interest in everything worth knowing and especially interested in Obstetrics. He helped me obligingly in measuring and studying the pelves here to be described.

<sup>5</sup>When I later had the opportunity to examine this pelvis I found that a line drawn straight forward through the middle of the articular surface at the base of the os sacrum cuts the left pubic bone at the point at which its body continues into the ramus transversus.

"It was the pelvis of a twenty-year-old girl, a primipara apparently well built, who always had been healthy and who had died after a craniotomy had ended the very difficult delivery. The specimen is marked 1703. Prof. VROLIK gave me permission to copy for you the notes which he had made about it: *Pelvis puellæ viginti annos natæ, in nosocomio clinico amstelodamensi post puerperium difficillimum, arte promotum, mortuæ. Singularem refert formam obliquam, quasi transversam. Jam a prima formatione sinistrum ossis sacri latus cum ileo ita concretum videtur, ut ilii superficies interna situm acquisiverit fere perpendicularem. Unde pelvis in hoc latere admodum coarctata et ossium pubis articulatio dextrorsum sit protracta et non promontorio ossis sacri, sed articulo sacro-iliaco dextro opposita.*

"When I had completed the examination of the specimen I submitted its description to Prof. VROLIK whose kindness and courtesy I admire. He examined it carefully, found it entirely accurate and flattered me for the skill that I had acquired under your guidance, in examining deformed pelves and in detecting their peculiarities. Permit me to add that I had a long conversation with VROLIK about the origin of these pelves. He firmly shares your opinion which you gave in your lectures that we are dealing with a *faulty development*—a fusion of the bones which took place before the formation of the osseous nuclei. He showed me very interesting specimens about the development of the pelvis and discussed with me the references in ALBINUS (*Icon. oss. fœtus hum.* Tab. IX, Fig. 69). It was so surprising as well as interesting to me when on this occasion VROLIK demonstrated a pelvis which is almost a copy of one which you mention in your paper 'On a peculiar species of malformed pelves' (*Heidelb. Klin. Annal.* Bd. 10, S 468). In both, the left lateral part of the first sacral vertebra is missing.

"VROLIK was very pleased to see that his collection had added to your discovery of this species of deformed pelvis. I noticed that some Dutch obstetricians who knew your former treatise on this subject through French and English journals were surprised to see that your discovery

at this time had not been mentioned in any German obstetrical journal though its great importance had been recognized in France, England, and even in America. On this occasion an ardent admirer of the eminent CAMPER quoted one of his epist. ad D.v.Gescher: *Id semper verum esse reperies, novitatem etiam expertis, maxime tamen imperitis, molestam esse.* My patriotism did not permit me to admit to a foreigner that this also applies to this case."

This is the description that Dr. UNNA sent to me from Amsterdam on February 12, 1836. VROLIK later was kind enough to send me the specimen itself in order to make some further measurements (which I mention later) and for comparison with several pelves of the same species. I was delighted to see how exact and observant Dr. UNNA had been in his examination and measurements of the specimen. I have only to add (as the former dimensions indicate and as has been confirmed by my own later examination) that this pelvis belongs to the kinds of deformity which are distorted to a higher degree and in which the cavity is markedly converged from above downwards.

I like to mention a deviation from the normal formation which the last lumbar vertebra of this specimen presents. As a glance at our plate indicates, there exists a process on the lower part of each of the two transverse processes of this bone. On the right side this process is connected with the upper part of the lateral portion of the first sacral vertebra, on the left side it is connected with the ilium by means of a fibro-cartilage as we find it on the auricular surfaces between the os ilium and os sacrum. We shall later refer to this anomaly.

#### No. 11

I owe the knowledge of this pelvis, that of the one just described, and that of the following pelvis to the interest that Dr. UNNA shares with me in this subject. Not long ago he discovered it in the anatomical-pathological collection in Basel.<sup>6</sup>

The specimen—the collection marks it C.II 70—consists of the ossa innominata and the os sacrum. The ankylosis of the symphysis sacro-iliaca and the unilateral mal-

<sup>6</sup>Later my esteemed friend, Professor JUNG of Basel (also one of my pupils) was kind enough to send me this pelvis for inspection. I wish to repeat my thanks.



formation of the os sacrum, etc., are found on the left side. According to its original development this pelvis is smaller than normal and is distorted to a moderate degree.

The length of the os sacrum from the promontory to the apex is 4" 7"', its greatest width is 3" 8"'. From the middle of the promontory to the right symphysis sacro-iliaca 2" 4"', and to the point at which this symphysis ought to exist on the other side 1" 7"'. The foramina sacralia anteriora on the left side are smaller than on the right side.

From the spina anterior superior to the spina posterior superior on the left ilium 5" 9"'; on the right ilium 6" 1"'. From the middle of the promontory to the spina anterior superior of the left ilium 4", to that of the right ilium 5". The distance between these two spines is 7" 11"'.

Diameter obliqua sinistra	4" 10'''
Diameter obliqua dextra	3" 11'''
Distantia sacro-cotyloidea sinistra	2" 2½'''
Distantia sacro-cotyloidea dextra	3" 5'''
From the promontory to the upper edge of the symphysis pubis	3" 7'''

A straight line drawn from behind forward through the middle of the articular surface on the base of the os sacrum cuts the left os pubis at the distance of 11''' from the middle of the upper edge of the symphysis pubis.

#### No. 12

Dr. UNNA discovered this specimen in the anatomical-pathological collection of the Medico-Surgical Academy of Dresden. It is marked No. 382.

The fusion of the os sacrum and the os ilium, the malformation of the os sacrum, etc., are on the right side. The greatest width of the os sacrum is 3" 10"'. From the middle of the promontory to the left symphysis sacro-iliaca 2" 4"', and to the point at which it ought to exist on the right side 1" 8"'. The concavity of the os sacrum is more marked than usually. The foramina sacralia anteriora are smaller on the right side than on the left. From the spina anteriora superior to the spina posterior superior on the right ilium 5" 5"', on the left ilium 5" 9"'. The distance between the two spinæ anterior. superior. is 7" 6"'.

<sup>7</sup>My esteemed friend, Professor L. S. RIECKE of Tuebingen, was kind enough to send me this pelvis for further examination. I wish to repeat my deepest thanks at this time.

Diameter obliqua dextra	4" 6'''
Diameter obliqua sinistra	3" 6'''
Distantia sacro-cotyloidea dextra	2" 4'''
Distantia sacro-cotyloidea sinistra	3" 3'''
From the promontory to the symphysis pubis	3" 6'''

Attached to this pelvis are the last lumbar vertebra and the two femoral bones. The preservation of this pelvis and its place in that collection are obviously—as also Dr. UNNA remarks—not due to the deformity that makes this specimen one of our species but due to the extensive changes and signs of destruction produced by Coxarthrocace which are seen on both sides. There is a new articulation formed above the left acetabulum which is for the most part filled in and obliterated. This new articular surface and the corresponding head of the femur are smoothly polished as a result of the friction. The right acetabulum is carious at the bottom as is the head of the right femur in the region of the ligamentum teres. Its circumference is covered with osseous granulations. The femoral bones and the other bones of this specimen indicate a healthy, strong, somewhat compact constitution.

#### No. 13

J. H. F. AUTENRIETH mentions this pelvis in his *Disser. med. chir. sist. observata quædam circa obstacula, quæ conditio symphysium pelvis præternaturalis synchondrotomiæ opponit. Tubingæ 1802* with the following words: *Asservatur in theatro nostræ universitatis anatomico pelvis feminea justæ amplitudinis, cujus os sacrum parte sua dextra ilium ossi dextro modo tali junctum est, ut plana superficie, si parietem symphyseos anteriorem contemplaris, os unum in alterum nullo discrimine conspicuo transeat. Serræ ope divisa pelvis vix ullum discrimen monstrat in superficie utraque sectionis.*

The specimen<sup>7</sup> consists of the two ossa innominata and the os sacrum which are united by means of wires. The pelvis is small. The ossification of the symphysis sacro-iliaca exists on the right side.

The os sacrum consists of five vertebræ. From the promontory to the apex 3" 6"'. From the middle of the promontory to the left symphysis sacro-iliaca 2" 1"', and to

the point on which it ought to exist on the other side 1" 3". Its anterior surface is only very slightly curved from above downward and is rotated to the right. Its base is inclined to the right, its apex to the left. A line drawn from the articular surface on the base through the middle of the bodies of the sacral vertebræ to the apex is curved laterally and its convexity is on the right side.

The right half of the os sacrum is imperfectly developed and on this side the foramina sacralia anteriora are much smaller than on the other side.

The right ilium measures from the spina anterior superior to the spina posterior superior 5" 2", the left 5" 8". From the middle of the apex ossis sacri to the spina ischii dextri 1" 10", to the spina ischii sinistri 2" 2".

#### *At the Inlet*

From the promontory to the symphysis pubis	3" 6"
Diameter obliqua dextra	4"
Diameter obliqua sinistra	3"
Distantia sacro-cotyloidea dextra	1" 8"
Distantia sacro-cotyloidea sinistra	3" 1"

A line drawn straight forward through the middle of the articular surface on the base of the os sacrum cuts the right pubic bone at the point at which its body continues into the ramus transversus.

#### *In the Cavity*

From the union of the second and third sacral vertebræ to the symphysis pubis	4"
From the bottom of one acetabulum to the other	2" 11"
From one spina ischii to the other	2" 5"

#### *At the Outlet*

From the apex ossis sacri to the symphysis pubis	4" 3"
From one tuber ischii to the other	2" 10"

The rami of the pubic arch form a very acute angle with each other.

In many respects this pelvis is very similar to a male pelvis. Many excellent anatomists have mistaken it for such after careful examination. Their opinion was based upon the shortness of the rami transversi of the pubic bones, the direction of the alæ of the iliac bones especially on the right side, the smallness of the foramina thyreoidea, i.e. the acute angle of the pubic arch, the narrowness of the cavity, the walls of which converge downward, etc., and, finally, upon the general form of the pelvis. Notwithstanding the very weak curvature of the os sacrum I also would be inclined to share this opinion were there not AUTENRIETH's unchallengeable testimony as to the origin of this pelvis. This, of course, was unknown to those experts who previously had rendered their opinion.

The section which AUTENRIETH mentions on the above quoted place is made with a fine saw. The pelvis is cut in such a way that the incision extends on the right ilium from the spina anterior inferior to the middle between the two spinæ posteriores and on the os sacrum to the articular surface on its base, thus dividing this surface in an oblique direction into two almost equal parts, passing almost through the middle of the fused region of the two bones. The one of these cut surfaces has been kept very well and shows a uniform bony tissue. There is no sign of a union of formerly separated parts. By means of a screw attached to the specimen, the separated part can be easily and accurately attached to the pelvis.

No. 14

(Plate II)

This specimen belongs to the collection of the Lying-in Hospital of Giessen. Apart from other reasons, it is noteworthy, as it concerns a case that is different from all other cases thus far known to us, inasmuch as the delivery of a child at term was accomplished without much difficulty by the unaided efforts of nature.<sup>8</sup> The pelvis belongs to a woman who has many times been the object of observation

<sup>8</sup>Dr. EMIL THIBAUT, the worthy son of my colleague and esteemed friend, THIBAUT, discovered this specimen in a collection in Berlin. Though he had been in Giessen only a short time, he, with thorough knowledge of the subject, examined it with the utmost care. He sent me the detailed description from Berlin on Feb. 5th, 1835. Later my friend, the esteemed

director of the Berlin Institute, Geheimrath Professor Dr. RITGEN was kind enough not only to send me this pelvis for further examination but he also gave me permission to make use of the records of labor of the woman to whom this pelvis belonged. I consider it a pleasant duty to express again my deepest and sincerest appreciation.

of a colleague of mine who is known to be a keen and accurate observer and examiner of those points which relate to our subject.

Let us first examine the specimen. It consists of all bones belonging to the pelvis and the last three lumbar vertebræ and has been prepared industriously and with special care. The quality of the bones is—aside from the deformity—normal in all respects.

The ankylosis of the symphysis sacro-iliaca and the imperfect development of the os sacrum, etc., are on the left side. Among those pelvises of our peculiar species which we ourselves have had the opportunity to examine, this pelvis belongs according to its development—apart from its distortion, etc.—to the roomier pelvises. In this respect it is similar to the one described under No. 15 with the exception that it is not distorted to as high a degree.

The region of the fusion of the os sacrum and the left ilium is smooth anteriorly, posteriorly and below. Only above near the pelvic inlet is there a slight ridge, an elevation smooth to the touch. In short these two bones appear to be formed entirely of one piece and nowhere—not even in the region in which the tuberositas ossis ilium is in contact with the sacrum—is there any indication of a former separation to be found.

The sacrum consists of five vertebræ. Its anterior surface is moderately curved from above downward. This surface as well as the anterior surfaces of the three lumbar vertebræ attached to the pelvis are rotated somewhat to the left. The width of the sacrum, that is from the right symphysis sacro-iliaca to the point of the fusion of this bone with the left ilium is 3" 6"". From the middle of the promontory to this point 1" 4"" and to the right symphysis sacro-iliaca 2" 4"". From the promontory to the apex 3" 7"". The foramina sacralia anteriora are somewhat smaller on the left side than on the right side.

The length of the os coccyx is 1" 3"". The body of the last lumbar vertebra is on the left side 1½"" lower than on the right.

On the left iliac bone from the spina anterior superior to the spina posterior superior 5" 1"", on the right 5" 11".

From the middle of the promontory to the spina anterior superior of the left iliac bone 3" 6½"", to that of the right iliac bone 5" 6½"". The distance between these two spinæ is 7" 11".

#### *At the Pelvic Inlet*

Diameter obliqua sinistra	5" 2""
Diameter obliqua dextra	3" 6""
Distantia sacro-cotyloidea sinistra	1" 9½""
Distantia sacro-cotyloidea dextra	3" 11""
From the promontory to the symphysis pubis	3" 9""

A line drawn straight forward through the articular surface on the base of the os sacrum cuts the region of the left pubic bone at the point on which the body continues into the ramus transversus.

#### *In the Pelvic Cavity*

From the union of the second and third sacral vertebræ to the middle of the symphysis pubis	4" 7""
From the bottom of one acetabulum to that of the other	4" 2""
From one spina ischii to the other	3" 7½""

#### *At the Outlet*

From the apex ossis sacri to the lower edge of the symphysis pubis	4" 9""
From one tuber ischii to the other	3" 6""

This is the pelvis of a forty-year-old woman who had always enjoyed the best of health with the exception of the childhood diseases including smallpox which she had overcome very easily. She was a brunette, of medium height, not of a robust constitution. She was otherwise normally built as was ascertained by a careful examination. She had a very healthy complexion and was menstruating since her fourteenth year. The external measurements taken at the Lying-in Hospital at Giessen revealed the conjugata to be normal.

In 1820 when she was twenty-eight years old, she was admitted for delivery to the Lying-in Hospital of Giessen. Previously she had delivered two children, the first when she was twenty years of age. Subsequently she bore four more children in the above named institution. All her deliveries were normal and without difficulty with the exception of the one before the last in which a forceps was used on account of weak pains. She always had gone to term, all children were delivered healthy and living. Their third child, born in 1820, was a girl of 6 lbs. 3½ oz. The fourth child, also a female, weighed 7 lbs. 6 oz. The fifth child, a



boy, weighed 7 lbs. 15 oz., and the last, also a male, 7 lbs. 8 oz. Her fourth and sixth deliveries (July, 1821, and April, 1831) had been especially well suited for observation according to the protocol of labor. In both, the head came through the pelvis in a position best suited for this deformity, i.e. with the occiput to the right anteriorly. On the fourth day after her last delivery which terminated quickly after the membranes had ruptured, the patient contracted a cold followed by an inflammation of the pelvis of which she died three weeks later.

#### No. 15

The pelvis now to be described is contained in the collection of the Park Street Medical School of Dublin, where my esteemed friend and colleague GEHEIMRATH TIEDEMANN discovered it in the autumn of 1853. His son HEINRICH, a scientifically promising man, was kind enough to make an exact measurement and description for me. Professor MONTGOMERY, of Dublin, was kind enough to send me a masterly plaster cast of this pelvis and of the male pelvis described under No. 36, which also belongs to our species. In the catalogue of specimens which this esteemed colleague had prepared for his students in October, 1834,<sup>9</sup> this pelvis is described under No. 89 in the following words: *Cast of an unusual Deformity of the Pelvis: The antero-posterior diameter being of the full size and the transverse much diminished. There was no sacro-iliac symphysis at the right side, and the same side of the sacrum was deficient.*—Dr. Hart.

On this pelvis the ankylosis symphyseo sacro-iliaca exists on the right side. It belongs to those which are—according to our knowledge—distorted to the highest degree. It consequently is closely related to those described under Nos. 4, 7, and 9 and those following Nos. 23 and 26.

The anterior surface of the os sacrum which consists of five vertebræ, is somewhat rotated to the right. It is only slightly curved from above downward as well as from one side to the other. Its height from the promontory to the apex is 3" 6""; its width from the symphysis sacro-iliaca sinistra to the point on which it is fused with the right ilium is 2" 8"". From the middle of the promontory to this point

11½"", and to the left symphysis sacro-iliaca 1" 11½"". The right half of the os sacrum on which the foramina sacralia anteriora are smaller than on the other side is imperfectly developed in its entire length. This arrest of development is so pronounced that the right ilium appears to be immediately connected with the body of the first sacral vertebra.

In the region of this complete fusion we do not find anywhere a trace of any formerly existing separation, neither above, nor below; neither in front nor in the back; in short, nowhere.

On the right ilium from the spina anterior superior to the spina posterior superior 5" 3"", on the left ilium 5" 7"".

From the middle of the promontory to the spina anterior superior of the right ilium 3" 5"", to that of the left ilium 5" 7"". From one of these spines to the other 8" 2"".

#### At the Pelvic Inlet

Diameter obliqua dextra	4" 8""
Diameter obliqua sinistra	3"
Distantia sacro-cotyloidea dextra	1" 7""
Distantia sacro-cotyloidea sinistra	3" 8""
From the promontory to the symphysis pubis	4" 1""

A line drawn straight forward through the middle of the articular surface on the base of the os sacrum cuts the point at which the body of the right ilium continues into the body of the right pubic bone.

#### In the Cavity

From the connection of the second and third sacral vertebræ to the middle of the symphysis pubis	4" 7""
From the bottom of one acetabulum to that of the other	3" 4½""
From one spina ischii to the other	2" 3""

#### At the Outlet

From the apex ossis sacri to the symphysis pubis	4" 6""
From one tuber ischii to the other	2" 9""
From the middle of the apex ossis sacri to the spina ischii dextri	1" 3""
and to the spina ischii sinistri	2" 4""

<sup>9</sup>Catalogue of the preparations in the Museum of W. F. MONTGOMERY, A.M.M.D., Prof. of Midwif. to the King and Queens Coll. of Phys. in Ireland. Dublin 1834.

This pelvis as all others of our species which are distorted to a higher degree shows a more pronounced convergence of its walls from above downward.

#### No. 16

Attached to this pelvis from the collection of the Lying-in Hospital of Leipzig<sup>10</sup> are the last two lumbar vertebræ and the first coccygeal vertebra. The left os innominatum is connected with the right and with the os sacrum by means of wires. The other bones (apart from the ankylosis) are connected by means of their ligaments. Apart from the distortion, etc., this pelvis is somewhat smaller than normal; the structure of the bones is mostly robust. To judge from the pubic arch, better the pubic angle, and from the structure of those bones which form this angle, one might mistake this for a male pelvis. On the exterior of the anterior pelvic wall and on the edge of the foramina obturatoria there are several small rough elevations, some pointed, others verrucose just as they are seen as a consequence of a former periostitis.

The ankylosis of the symphysis sacro-iliaca is on the right side. Facing the pelvis from the front there are several small uneven spots on the point at which the symphysis ought to be. They are small ridges in antero-posterior direction, more elevated anteriorly. They may be taken as an indication of a symphysis by those who know that there normally is one at this point. (It should be noted that this region has been examined with a pointed instrument, probably in order to make an exact examination). Posteriorly and on the lower part of the region on which the spina posterior inferior ossis ilii continues into the os sacrum there is no trace of unevenness or any other sign of a former separation between these two bones.

The os sacrum consists of six vertebræ and is markedly concave in the region of the third and fourth vertebra. Its anterior surface, as the anterior surfaces of the bodies of the lumbar vertebræ, is rotated somewhat to the right. The right half of the os sacrum is imperfectly developed in its entire length. The foramina sacralia anteriora of this side are smaller than on the other side; especially the first of

these holes which is hardly half as large as the one on the opposite side. From the middle of the promontory to the symphysis sacro-iliaca sinistra 2" 2"', and from there to the point on which it ought to exist on the other side 1" 3". From the promontory to the apex 3" 5".

From the spina anterior superior to the spina posterior superior on the left ilium 5" 6"', on the right ilium 5" 2". The incisura ischiadica on the right side is narrower than that on the left.

#### *At the Inlet*

Diameter obliqua dextra	4" 6'''
Diameter obliqua sinistra	3" 3'''
Distantia sacro-cotyloidea dextra	1" 6'''
Distantia sacro-cotyloidea sinistra	3" 4'''
From the promontory to the symphysis pubis	3" 5½'''

A line drawn straight forward through the middle of the articular surface on the basis ossis sacri cuts the right pubic bone at the point at which its body continues into the ramus transversus.

#### *In the Cavity*

From the connection of the second and third sacral vertebræ to the symphysis pubis	4" 5'''
From the bottom of one acetabulum to that of the other	3" 9½'''
From one spina ischii to the other	3" 5'''

#### *At the Outlet*

The distance between the tubera ischii (after separating the ossa pubis as much as is found to be necessary on account of the missing pubic cartilage)	3"
From the middle of the apex ossis sacri to the spina ischii sinistri	2" 8'''
To the spina ischii dextri	1" 8'''

Having heard that this pelvis had previously been in the possession of my very dear friend Dr. OTTO of Breslau, I asked him for information about the person in whose body it was found. Unfortunately, I learned that the speci-

<sup>10</sup> My former pupil, the gifted Dr. L. BRESSELAU of Hamburg, discovered this pelvis in that collection. He examined it and gave me its thorough description. Dr. EBERH. NOLTENIUS, of Bremen, an equally worthy young man, also a pupil of mine,

who passed Leipzig on a journey, was kind enough to make a drawing of it for me. The esteemed Dr. ED. JOERG later, upon my request, obligingly sent me the specimen for inspection. I wish to repeat publicly my most sincere thanks to him.

men had been exchanged for some Marsupialia which he eagerly wanted. It belonged to an old collection and he knew nothing about it.

#### Nos. 17 and 18

Dr. J. N. LINGER of Warnach, the province of Luxemburg, a talented and learned physician who visited our Lying-in Hospital in the autumn of 1835, saw my collection of pelves and became especially interested in the deformity of which we speak in this book. In April, 1836, he was kind enough to send me actual size masterly pictures of two female pelves which belong to our deformity. As he wrote to me he was fortunate enough to find them in the specimen cabinet of Loewen.

Both reveal the ankylosis of the symphysis sacro-iliaca and the defect on the sacrum on the right side. Both specimens consist of the os sacrum and the right os innominatum. When I saw the pictures they reminded me of the pelvis which C. C. SIEBOLD and J. P. WEIDMANN have reproduced in their well-known treatise *Comparat. inter sectionem cæsar*, etc., of which I shall later speak in more detail.

One of the pelves—marked 370 in the collection—is distorted in a higher degree, while the other—marked 372—is only moderately distorted. On the first, a line drawn straight forward through the middle of the articular surface at the base of the os sacrum cuts the right pubic bone at the point at which its body continues into the ramus transversus. On the other pelvis, this line cuts the point at which the ramus transversus of the right pubic bone continues in the ramus descendens, about 1" distant from the symphysis pubis.

On the pelvis No. 370, the distance between the middle of the promontory to the left symphysis sacro-iliaca 2" 3"', and to the region of the missing symphysis on the other side 1" 3"'. The foramina sacralia anteriora on the right side are smaller than on the left. Especially, the first one which is just half the size of the one on the opposite side.

Distantia sacro-cotyloidea dextra 1" 8"'. From the promontory to the symphysis pubis 3" 11"'.<sup>11</sup>

On the specimen No. 372, the distance between the

middle of the promontory to the left symphysis sacro-iliaca is 2" 2"', and to the place of fusion of the os sacrum and the right os ilium 1" 6"'.<sup>11</sup>

Distantia sacro-cotyloidea dextra 2" 5"'. From the promontory to the symphysis pubis 4" 1"'.<sup>11</sup>

#### No. 19

Two pelves belonging to our species of deformity, one a female, the other a male, are in the museum DUPUYTREN at Paris. The female pelvis, marked in the collection No. 234, consists only of the os sacrum which is united with the right os innominatum. As in the above mentioned two pelves, we find quite often in these collections specimens of ankylosis of the os sacrum with one os innominatum. These specimens are either found in anatomical institutes or in the course of an autopsy. When the examiner discovered the ankylosis he probably did not consider it sufficiently important to preserve the os innominatum without ankylosis which looked normal. Finally it might have been removed in order to facilitate the preparation of the part that is considered to be important. On the female pelvis the anterior surface of the os sacrum is somewhat rotated to the right. It is curved in such a way that its middle line represents a curve the concavity of which is directed to the right. The right half of this bone is atrophic in its entire length. The fusion with the right os ilium is complete. There is no trace of a formerly existing articulation. On the anterior surface of the ramus descendens of the pubic bone there is in the median level of the symphysis pubis near the symphysis a small exostosis about four lines long and two lines broad.

Distantia sacro-cotyloidea dextra	2" 8"'
From the middle of the promontory to the upper	
edge of the symphysis pubis	3" 10"'' <sup>11</sup>

#### No. 20

The oldest bony specimen that probably ever has been examined in relation to obstetrics is the pelvis of the skeleton of an Egyptian mummy. This pelvis belongs to our species of deformity.

This skeleton (*d'une momie Egyptienne, femelle*,

<sup>11</sup>I owe this communication and also the description of the other pelvis found in the above mentioned museum—which is going to follow later—to the kindness of my former pupil, Dr.

HEINRICH NEBEL (son of my very esteemed friend, Medicinal-rath NEBEL), a very capable young man, whom I shall repeatedly have occasion to mention.



*rapportée d'Alexandrie et donnée par M. le Comte de Moncabrie, capitaine de vaisseau*, as the label indicates) is in the third room of the ground floor in the Musée d'Anatomie comparée in the Jardin du Roi in Paris. This pelvis reveals in a striking manner all essential symptoms of our deformity.<sup>12</sup> The following is the description of the specimen as Dr. N. sent it in two letters from Paris (dated August 10th and October 3rd, 1836). Any expert will readily acknowledge the precision of examination and the scrupulous accuracy of this young man as well as his thorough knowledge of our subject.

"The skeleton was found (as the conservator says) almost entirely in its present state. The mummy was embalmed in sodium—not as other mummies in resins. Its soft parts were decayed to powder in which the skeleton prepared by an anatomist was lying. In fact, it is distinguished by its cleanliness and the white color of the bones from other skeletons of mummies which I had the opportunity of seeing. It appears to have belonged to a woman of about thirty years of age. The pelvis excepted, it is perfectly well built. The bones are very slender and delicate without showing any trace of rickets. The vertebral column is straight.

"The pelvis is distorted just in the same manner as all specimens of the special kind of deformity which I have seen in your collection. It resembles the pelvis which exists in the Maternité of Paris which I have repeatedly seen here and of which you possess a plaster cast.

"The pelvis of the mummy differs from this in revealing the ankylosis of the symphysis sacro-iliaca not on the left side but on the right. This osseous union is as complete as in the aforementioned pelvis. In the region of the ankylosis there is to be seen a small prominent ridge. Unfortunately apparently due to awkward handling, the ilium is broken from the sacrum in the region of the ankylosis. This may readily occur in the delicate and fragile condition of these bones. However, the fractured surfaces which I have examined most carefully in order to fully satisfy the request in your letter of September 12th, leave no doubt of the formerly existing complete ankylosis.

<sup>12</sup>I also owe this interesting addition to my collection of cases to the love and zeal with which Dr. H. NEBEL—like others of my pupils—tried to respond to my request which I made to my pupils during my lectures as often as this class of pelvis

"The os sacrum whose anterior surface is turned somewhat to the right is curved on its lower end in the region of the last two lumbar vertebræ, to the left. Its right half is imperfectly developed. From the middle of the promontory to the left symphysis sacro-iliaca 2" 3"', and to the region where this bone is fused with the right ilium 1" 8'''.

"The right os ilium is less developed than the left. From the spina anterior superior to the spina posterior superior of the right os ilium 3" 6"', to that of the left os ilium 3" 11'''. From the middle of the notch between the spina anterior superior and the spina anterior inferior to the spina anterior superior on the right side 3" 5''', on the left 3" 10'''. From the spina anterior inferior of the right ilium to the uppermost part of its union with the sacrum 3" 8'''. From the same point on the left ilium to the uppermost part of the symphysis sacro-iliaca sinistra 4".

"The diameters which appear to me especially important for your purposes are the following:

From one spina ossis ilii anterior superior to the other	8" 2'''
<i>"At the Inlet</i>	
Diameter obliqua dextra	5"
Diameter obliqua sinistra	3" 8'''
Distantia sacro-cotyloidea dextra	2" 1½'''
Distantia sacro-cotyloidea sinistra	3" 8'''
From the region above the acetabulum of one side obliquely across to that of the other	3" 8'''
From the promontory to the symphysis pubis	4" 1'''

A line drawn straight forward through the middle of the articular surface at the base of the os sacrum cuts the ramus transversus of the right pubic bone almost in its middle.

"The pubic arch is less roomy than on the well-formed pelvis. It is asymmetrical on account of the abnormal direction of its right ramus which appears distorted as by pressure acting from below upward and from without in a direction opposed to that of the right oblique diameter."

Dr. N. knew how interested I was in this subject and

was spoken of in the chapter of deformations of the pelvis. I always asked them to search for similar specimens on their scientific journeys.

took very great pains to prove most convincingly and without leaving any doubt that the pelvis of this mummy according to all essential characteristics belongs to this special kind of deformity. He took many most minute measurements in all directions. He, for instance, most carefully compared the linea ilio-pectinea of the ankylosed side with that of the other side, etc. Many of these details which I thankfully accepted from the observer are omitted here because they would represent repetitions for the attentive reader of this work. Nevertheless I like to mention that Dr. N. used the same kind of presentation as I suggested. This fact proves how well this manner of presentation is suited to give an exact idea of the main characteristics to those who never have seen such pelves.

#### No. 21

In 1836, the same expert, Dr. H. NEBEL discovered another specimen of our deformity in the Conservatoire de l'école de Médecine of Montpellier.

The ankylosis, the imperfect development of the os sacrum, etc., are on the right side of this pelvis.

The distantia sacro-cotyloidea of the right side is much smaller than that of the other. The right oblique diameter is larger than the left.

The distance between one spina ischii and the other and between one tuber ischii and the other is considerably diminished. The pubic arch resembles that of the male, etc.

The vertebral column which still exists up to and including the second dorsal vertebra is, in its upper part, curved anteriorly. There were no notes of the history of the person to whom this pelvis belonged.

#### No. 22

When my son, H. Fr. NAEGLE, was in Paris in 1834, he learned from the esteemed Mme. LEGRAND, sage-femme en chef de l'hospice de la Maternité, that there was another pelvis in the institution which completely resembled that described under No. 4. Though he repeatedly inquired about this pelvis he was unable to see it. He was told that it had been damaged. When later (in 1836) Dr. H. NEBEL, at my request, started further inquiries about it he learned from PAUL DUBOIS that this pelvis had been completely similar in the degree of distortion, the complete fusion of the sacrum with the left ilium, etc., to the one still pre-

served in the Maternité. It had not only been damaged during preparation but it had been lost through the carelessness of an interne.

According to a letter about this case which the esteemed DUBOIS wrote to me on April 28th, 1837, a young, large, strong, apparently well-built woman was brought into the Maternité in a dying condition after several days of futile labor. The head of the dead child had been forced into the pelvic cavity and was delivered by means of forceps. Immediately afterwards the woman died. On external observation this woman did not show any symptom suggestive of this pelvic deformity. D. also pointed out—what we mentioned before—how complete the similarity of these two pelves was. He further remarked that the pelvic bones did not show any trace of rickets. They were, the deformity excepted, like those of healthy individuals in development, size, strength, etc. The whole constitution of both women (the one here described and that described under No. 4) did not show anything suggestive of rickets. According to the information both started to walk rather late. They always had some difficulty in walking and this "difficulté de marcher" had already revealed itself at an age at which children start to stand up and try to walk. From childhood on they never had noticed any pain in the lumbar or pelvic region. Nothing had occurred which could have caused that difficulty in walking.

DUBOIS' thorough knowledge, his well-known accuracy as an observer, and the genuine interest in this subject which he proved in his thesis in the concours for the chair of Obstetrics, manifest sufficient authority to have this pelvis placed in the series which we here present.

#### No. 23

When in the summer of 1834 my esteemed friend, Dr. BROERS, Professor of Obstetrics in the University of Leyden, saw my collection of obliquely contracted pelves, he showed a deep interest and promised to search for similar specimens. Soon after his return he discovered, in a mortuary near Leyden, the specimen which we are going to describe. It consists of the right os innominatum fused with the os sacrum and belongs to those of our species which are distorted to a high degree. The width of the os sacrum at its base is only 2" 10''' and the distance between the middle of the promontory and the region above the right



acetabulum is only 1" 3<sup>'''</sup>. The fusion of these two bones is complete; *symphyseos sacro-iliacæ* [as he expresses himself in his letter] *nullum superest vestigium, ut os innominatum cum osse sacro unum videatur os constituere*. The ilium is immediately united with the body of the first sacral vertebra and appears to have grown from it. The bones do not show any trace of a diseased condition.

#### No. 24

The specimen here to be described<sup>13</sup> consists of the os sacrum ankylosed with the left os ilium. It is of less than normal size and its bones are thin, weak and slender. It belongs to those pelves of our species which are distorted in a moderate degree. The bones do not show any signs of disease with the exception of the acetabulum and a part of the ala ossis ilii, both of which we shall speak of later.

The anterior surface of the os sacrum is somewhat rotated to the left; its concavity is normal. From the promontory to the apex 3" 5<sup>'''</sup>. Just as great is the distance between the symphysis sacro-iliaca dextra and the region in which it ought to exist on the left side. From the middle of the promontory to these two regions is 2" 1<sup>'''</sup> and 1" 5½<sup>'''</sup> respectively. The upper two foramina sacralia anteriora on the left side are much smaller than on the right. The two lower are missing since the left part of the os sacrum has been broken off from its third vertebra downward.

The fusion of the os sacrum and the os ilium is complete. This region is smooth anteriorly and below. Above we see here and there several small irregularities and a flat depression. It appears difficult to us to say whether they have been produced by the tooth of time or the teeth of rats to which the specimen was exposed, or by any other cause.

#### *The Pelvic Inlet*

Distantia sacro-cotyloidea sinistra	2" 4½ <sup>'''</sup>
From the promontory to the symphysis pubis	3" 9 <sup>'''</sup>

<sup>13</sup>I owe the knowledge of this specimen to my esteemed friend STOLTZ, the worthy successor to FLAMANTS in the chair of Obstetrics at the University of Strassburg. Prof. Stoltz, very interested in science in general and especially in the subject of malformations of the pelvis, had come here in the summer of 1836 from Strassburg and had examined the considerably large collection of obliquely contracted pelves which I had by then

A line drawn straight forward through the middle of the articular surface on the basis ossis sacri cuts the region at which the ramus transversus of the left pubic bone continues into its ramus descendens (at a distance of about 7<sup>'''</sup> from the symphysis pubis).

In this case in addition to the deformity which is the subject of this treatise there is a diseased condition (an accidental finding in our opinion). It involves the acetabulum of the ankylosed side and spreads to a large part of the ala ossis ilii. The changes are the following: The largest part of the ala especially near the body of the bone is thickened. The acetabulum is much wider and deeper than normally so that its bottom protrudes like a ball into the pelvic cavity. In addition to this condition it reveals remarkable and pronounced symptoms of a previous inflammation and purulent destruction. Its bottom is much thinner and transparent than normally. It reveals five big and several small holes, two of which admit the tip of the finger. The one of these near the deepest part of the acetabulum is 8<sup>'''</sup> long and half as broad. Evidently these holes are not the result of external causes acting after the death but that of purulent destruction. That part of the acetabulum which protrudes into the pelvic cavity and which is free from holes is as thin and transparent as paper. In the cavity and on the edge of the acetabulum and also all around it there are signs of abscesses and destruction and also here and there reproduced bony granulations.

The specimen which is newly varnished is apparently very old. It is as light as are bones which have been exposed alternately to moisture and fresh air for a long time, as they are found in churchyards or in mortuaries. Here and there it shows a trace of a certain whiteish change which is found in those bones.

Whoever would in this case think of osteomalacia adutorum should be reminded of what I said before about the thin, weak and slender condition of the bones. Also the ramus transversus of the pubic bone is not curved inward

gathered from many distant places through the kindness of several of my friends in order to compare one with the other. Thoroughly informed of our special group of pelvic deformity, on the trip which he made in the autumn of the same year in his capacity as President of the Jurys Medicaux in Bourg in the Department of Ain he discovered this specimen in an old container, where it had been a prey to rats for many years.

as is usually found in those osteomalacic pelves but it is straight. Only the bottom of the acetabulum protrudes into the pelvic cavity.

#### No. 25

Dr. NEBEL saw this specimen in the collection of my friend, Professor Dr. G. SALOMON of Leyden. It consists of the os sacrum and the right os innominatum and belongs to those pelves which are distorted to a higher degree. The synostosis of these two bones is so complete that no trace is to be found—neither by sight nor by touch—of a former existing synchondrosis. The right half of the os sacrum is in its entire length imperfectly developed to a high degree. From the middle of the promontory to the outermost end of the left processus transversus of the first sacral vertebra—to the point on which the anterior edge of this processus continues into the linea innominata of the left os ilium—2" 4"', to the region in which the symphysis sacro-iliaca ought to be on the right side 1" 3"'. Distantia sacro-cotyloidea dextra 1" 11"'. A line drawn straight forward through the middle of the articular surface at the base of the os sacrum cuts the ramus transversus of the right pubic bone almost in its middle.

#### No. 26-30

My esteemed friend and colleague, Professor Dr. TH. BISCHOFF, shares with his former teacher the interest in our deformity. Having a thorough knowledge of it he saw, in the autumn of 1837, three specimens in the anatomical institute of the University of Vienna. He saw two more specimens of this type—besides that described under No. 5—in the pathological museum of the General Hospital of Vienna. All five reveal the imperfect unilateral development of the os sacrum and the fusion with the os ilium on the right side. We limit ourselves to publish the following dimensions of one of the three first mentioned. It is distorted to a very high degree. From the middle of the promontory to the symphysis sacro-iliaca sinistra 2" 1"', and to the point on which this symphysis ought to exist on the other side 1".

<sup>14</sup>DEGRANGES in his excellent paper: "Sur la sect. de la symph. des os pubis" (*Journ. de méd.* T. 68, page 86), as well as the learned MURAT in *Dict. des sc. méd.* T. 54, p. 49, present these two pelves as one in which the right symphysis sacro-iliaca is partly ossified, the left totally ossified. Murat also transforms WEIDMANN into WIEDEMANN.

Diameter obliqua dextra	4" 7'''
Diameter obliqua sinistra	2" 11'''
Distantia sacro-cotyloidea dextra	1" 9½'''
Distantia sacro-cotyloidea sinistra	3" 8'''

#### No. 31

Anyone who has seen any pelves of our deformity will readily notice that the specimen which CARL CASPAR SIEBOLD and J. P. WEIDMANN mention in their paper on *Comparat. inter. sect. cæsar. et dissect. cartilag. et ligament. pubis* (Wirceb. 1779), a picture of which they show on the second plate, Fig. II, belongs to our kind of deformity. The ankylosis of the symphysis sacro-iliaca is on the left side. The base of the os sacrum is pushed to the left, the symphysis pubis to the opposite side. The contraction exists in the direction of the right oblique diameter. The other pelvis, whose picture is on the same plate, Fig. I, does not belong to our species. It represents a partial ankylosis of the right symphysis sacro-iliaca by hyperostosis in the upper region of the symphysis.<sup>14</sup>

#### No. 32, 33, and 34

DEGRANGES in the above quoted paper mentions a pelvis in the following terms: *Je connois un bassin, qui appartenait à une femme morte en travail de son second enfant, dont l'os innominé gauche est absolument soudé avec l'os sacrum, y ayant un gonflement à l'endroit de leur juste position. La macération la plus longue dans l'eau chaude, m'a convaincu, qu'il y a ankylose parfaite, ou soudure intime des deux pièces, par l'effet de leur engorgement réciproque, et l'endurcissement de la substance intermédiaire.* We do not wish to decide whether this pelvis belongs to our kind of deformity though the complete ankylosis of the left sacro-iliac articulation and the fact that the woman died in labor make it appear very probable.

But I have no doubt that those three pelves, which C. v. KRAPF mentions in his valuable paper<sup>15</sup> in the following terms, belong to our species: "Mr. KNAUS, prosector and

<sup>15</sup>CARLS V. KRAPF, K. K. Hofrathes and Leibarztes etc., *Anat. Versuche und Anmerk. ueber die eingebildete Erweiterung der Beckenhoehle in natuerl. und angepriesene Durchschneidung des Schambeinknorpels in widernatuerlichen Geburten* u.s.w. II Theil Wien 1781. S. 42.



extraordinarius of Anatomy for surgeons at this university, has a pelvis in his anatomical collections that I have reproduced on account of its peculiarly irregular form. The right os ilium is completely fused with the os sacrum though the dead woman to whom this pelvis belongs was less than twenty-four years old. The distance between the two tuberositates ischii is only two inches. I remember having seen two female pelves of the same type in the anatomical museum of Trieste when I was searching for a certain pelvis for the school of obstetrics where I had to lecture at the request of highest authority."

It is a well-known fact that even in the prime of life ankylosis of one or both sacro-iliac articulations exists without any oblique distortion, etc. But no one who has seen specimens of any kind and who has had occasion to compare them with others will doubt that the pelvis of KNAUS' collection and—for the same reasons—the other two pelves which v. KRAPF mentions belong to our species of deformity. V. KRAPF says explicitly: (1) that the right os ilium is completely fused with the os sacrum, thus forming a complete ankylosis; (2) that the pelvis had a peculiarly irregular form, whereby this experienced and accurate observer evidently excludes that deformity caused by rachitis or osteomalacia adultorum, furthermore (3) that he reproduced this pelvis on account of this peculiarly irregular shape, and finally (4) that the distance between the two tuberositates ischii is only two inches. Reading this I was surprised to see that this man had undergone the same experience as I. As he—by looking at Knaus' pelvis—had been reminded of the two similar specimens which he had seen in Trieste, I had immediately noticed in 1828 the striking resemblance of the pelvis described under No. 3 to those two pelves seen twenty-five years ago (Nos. 1 and 2). I like to mention that the pelves referred to by v. KRAPF belonged to those collections before the dispute about the value of the SIGAULT operation had started and before the opponents of this operation had raised the ankylosis of the symphysis sacro-iliaca as an objection against its practicability. Consequently these pelves had been collected at a time in which no one was especially interested in this ankylosis and in which no pelvis would have been anatomically prepared solely on account of the ankylosis without further deformity even in case this ankylosis would have been discovered (which is very un-

likely) immediately in the course of an autopsy. There is no doubt that solely the peculiarly irregular shape of those pelves and possibly also their harmful influence during labor were the cause for separating these pelves from the bodies and preparing them, etc.

#### No. 35

There is no doubt that the pelvis which J. TH. VAN DE WYNPERSE mentions in his valuable paper *De ancylosi* (*Lugd. Bat. 1785*) in which he treats the consequences of ankylosis in general and, in particular, the difficulty of labor which originates from the fusion of pelvic bones, also belongs to our species. Immediately after stating that the harmful influence on labor is more pronounced if contraction exists together with ossification of one or all cartilagenous connections of the pelvic bones (*si ancylosi accedat diametrorum pelvis a recta deflexio aut brevitatis*), he adds: *Tale quid mihi inprimis liquet ex eximio, mihi nuperrime allato, ossis sacri cum primo coccygis et in-nominato dextro confluxu plenario: in quo notandum, os sacrum solitam habere adultorum longitudinem, et in sinistra parte excepta cum coccyge ancylosi, satis esse naturale, in dextra autem quatuor, quibus gaudet, foraminum superius esse perparvum, forma ovali, reliqua magis oblonga, adeo compressa, ut nervis e medulla spinali tendentibus spatium relictum fuerit perexiguum, quorum foraminum tenui margine os sacrum illo in latere finitur, adeoque ibidem multo minorem, quam in opposito habuit latitudinem. Hæc forsitan causa fuit, quare coxæ dextræ os atrophicum quasi sit, et dimidiam vix adulti magnitudinem æquet; dum sinistrum, quod non coaluit, magis naturale fuisse videtur. Ex hac atrophica constitutione, etiam factum, ut diameter conjugata (si recta fuerit, quod non videtur ex parte superstite concludendum) tres saltem pollices non superaverit, vix credo, æquaverit femurque pariter atrophicum fuerit.*

### B. Male Pelves

#### No. 36

The pelvis to be described here was mentioned by me under No. 15. It belongs to the collection of the esteemed Professor MONTGOMERY of Dublin. In his catalogue (which I mentioned before) he says under No. 91 *specimen of*

*deformed pelvis of an unusual kind and similar to No. 89 except that the sacro-iliac symphysis is deficient on the left side, etc.* I own a plaster cast of the pelvis which is a correct copy of the original and which MONTGOMERY was kind enough to send me through my esteemed friend and colleague TIEDEMANN who made exact comparative studies with the original.

This pelvis is large and apart from the deformities is well developed. The three last lumbar vertebræ are attached to it. The os sacrum consists of five vertebræ. Its base is inclined to the left, its apex to the right. Its anterior surface is almost flat from above downward, from the promontory to the junction of the fourth with the fifth sacral vertebra. From one side to the other this surface is less concave than normal; it is somewhat rotated to the left. The left half of this bone is to a remarkable extent imperfectly developed in its entire length.

The breadth of the left ilium from the spina anterior superior to the spina posterior superior is 5" 9"', the breadth of the right is 6" 3''.

The width of the incisura ischiadica sinistra is much smaller than that of the right.

#### *At the Inlet*

Diameter obliqua sinistra	4" 7'''
Diameter obliqua dextra	3" 7½'''
Distantia sacro-cotyloidea sinistra	2" 3'''
Distantia sacro-cotyloidea dextra	3" 2'''

A line drawn straight forward through the middle of the articular surface of the base of the os sacrum cuts the point at which the ramus transversus of the left pubic bone continues into the ramus descendens.

#### *In the Pelvic Cavity*

From the junction of the second and third sacral vertebræ to the middle of the symphysis pubis	3" 9'''
From the bottom of one acetabulum to the other	3" 6'''
From one spina ischii to the other	2" 9'''

#### *At the Outlet*

From the apex of the coccyx to the symphysis pubis	4" 2'''
From one tuber ischii to the other	2" 5'''

On the right side of the anterior surface of the bodies of the three lumbar vertebræ in the region in which they connect with each other there are two exostoses of the shape and size of an almond.

#### No. 37

Besides the female pelvis described under No. 19, there exists a male pelvis in the Musée Dupuytren, at Paris, which belongs to our species of deformity. Like the female, it consists only of the os sacrum and one os innominatum. The sacrum is fused with the left ilium whereas it was fused with the right ilium on the female pelvis. The middle line of the os sacrum (drawn from above downward through the middle of the bodies of the sacral vertebræ) presents a slight curve, the concavity of which is directed to the left. The left half of this bone is imperfectly developed. The foramina sacralia of this side are smaller than those of the other side. The anterior surface of this bone is somewhat rotated to the left.

Distantia sacro-cotyloidea sinistra	2" 6'''
From the promontory to the symphysis pubis	3" 2'''



# IV

## Description

### OF SOME PELVES SIMILAR TO THOSE PREVIOUSLY MENTIONED

Though we do not yet dare to decide with certainty whether the pelves which follow should be regarded as *intermediate degrees* of our special kind of deformity, we like to mention them here in order to offer these cases for comparative studies to those who have access to large collections or at least to call their attention to the subject.

#### No. 1

Since 1813 I have in my collection a female pelvis, well prepared, apparently that of a young person. I referred to this pelvis in an earlier paper which I previously mentioned. This pelvis to which three lumbar vertebræ are attached is distorted in the same manner as those just described only in such a slight degree that it would not have presented any difficulty at the time of delivery. It shows all the main characteristics of our species except *that on the side on which the os sacrum is imperfectly developed there is no ankylosis of the symphysis sacro-iliaca. The cartilaginous connection is perfectly normal.*

The os sacrum consists of six false vertebræ, the os coccyx, as usual, of four. The anterior surface of the bodies of the lumbar vertebræ is, as the anterior surface of the os sacrum, somewhat rotated to the right. The right half of the os sacrum is shrunken or imperfectly developed in its

entire length. From the middle of the promontory to the right symphysis sacro-iliaca 1" 7"', to the left 2" 4"'. The foramina sacralia anteriora of the right side are with the exception of the one next to the last, narrower than on the left side. The first one is only half as wide as that on the opposite side.

On the right iliac bone the distance between the spina anterior superior to the spina posterior superior is 5" 8"', on the left it is 5" 11"'. The os innominatum next to the atrophic half of the os sacrum is distorted in the same manner as in those pelves previously described. The right incisura ischiadica is much narrower than the normal one on the left side.

#### *At the Inlet*

Diameter obliqua dextra	4" 9"
Diameter obliqua sinistra	4" 2"
Distantia sacro-cotyloidea dextra	2" 7"
Distantia sacro-cotyloidea sinistra	3" 7"
From the promontory to the symphysis pubis	4" 2"

A line drawn straight forward through the middle of the articular surface on the basis ossis sacri cuts the right pubic bone at the distance of 8"' from the middle of the upper edge of the symphysis pubis.

*At the Outlet*

From the apex ossis sacri to the lower edge of the symphysis pubis	4" 6 <sup>'''</sup>
From one tuber ischii to the other	3" 7 <sup>'''</sup>

No. 2

My friend and former pupil, the esteemed Professor A. A. SEBASTIAN of Groningen, has in his possession a female pelvis which is similar in all essential characteristics to the one just described. When he, in 1836, inspected my collection of obliquely contracted pelves he immediately was reminded of the striking resemblance of those two pelves. After his return he was kind enough to send me the following description:

The right half of the os sacrum is imperfectly developed in its entire length. Both synchondroses sacro-iliaca are normal. From the middle of the promontory to the right symphysis sacro-iliaca 1" 6<sup>1</sup>/<sub>2</sub><sup>'''</sup>, to the left 2" 6<sup>'''</sup>. The anterior surface of the os sacrum is somewhat rotated to the right. From the middle of the anterior surface of the body of the fourth lumbar vertebra to the labium internum cristæ ossis ilii on the right side 3" 3<sup>'''</sup>, on the left 4".

*At the Pelvic Inlet*

Diameter obliqua dextra	4" 6 <sup>1</sup> / <sub>2</sub> <sup>'''</sup>
Diameter obliqua sinistra	3" 10 <sup>'''</sup>
Distantia sacro-cotyloidea dextra	2" 4 <sup>'''</sup>
Distantia sacro-cotyloidea sinistra	3" 8 <sup>'''</sup>

No. 3

My friend and former pupil, Dr. EDWARD RIGBY<sup>1</sup> discovered in the collection of the St. Bartholomew Hospital of London a female pelvis, which is very similar to those pelves described before. I confine myself to some essential data of an examination and description of the specimen which was made by Dr. RIGBY and Dr. NEBEL and which the latter sent to me from London on June 21, 1837.

The pelvis belongs to those of more than medium size. The imperfect development of the os sacrum is also on the right side.

<sup>1</sup>Teacher of Obstetrics at this hospital and Physician-Accoucheur to the General Lying-in Hospital, etc. He is the worthy son of the highly esteemed author of the classical work

Diameter obliqua dextra	5" 11 <sup>'''</sup>
Diameter obliqua sinistra	5" 1 <sup>1</sup> / <sub>4</sub> <sup>'''</sup>
Distantia sacro-cotyloidea dextra	3"
Distantia sacro-cotyloidea sinistra	3" 10 <sup>1</sup> / <sub>2</sub> <sup>'''</sup>
From the promontory to the symphysis pubis	4" 10 <sup>1</sup> / <sub>2</sub> <sup>'''</sup>

A line drawn straight forward through the middle of the articular surface at the base of the os sacrum cuts the right pubic bone at a distance of 1" from the symphysis pubis.

Attached to the pelvis are the two last lumbar vertebrae which do not give any information as to the condition of the rest of the vertebral column.

No. 4

A remarkable parallel to those three pelves just described is furnished by a male pelvis in my anatomical collection. Like those, it shows all essential characteristics of our special kind of deformity except one. It is differentiated from those three by the fact that the unilateral atrophy of the os sacrum is lacking; not the ankylosis of one of the ilio-sacral articulations. The fusion of the right os ilium with the os sacrum is as complete as in those pelves described in Chapter III.

The oblique distortion exists in a considerably smaller degree but is as complete as in the formerly described pelves. The anterior surface of the os sacrum is somewhat rotated to the right. The distance of the spina anterior superior to the spina posterior superior on the right os ilium is 4" smaller than on the left. The right os ilium is at a higher level and it is steeper than the left. The more perpendicular right acetabulum is directed less exteriorly and more anteriorly. The right incisura ischiadica is narrower than the left. The tuberosity of the right os ischium is on a higher plane than that of the left.

The right oblique diameter of the inlet measures 9" more than the left. The distantia sacro-cotyloidea dextra is 7" smaller than the left. A line drawn straight forward through the middle of the basis ossis sacri cuts the right pubic bone at a distance of 7" from the symphysis pubis.

The structure of the bones of this specimen is remark-

"On the uterine hæmorrhage which precedes the delivery of the full-grown fœtus, etc."

ably heavy and the general impression at the first glance makes one think of a pelvis of an animal. Each ilium reveals, in the region of the spina anterior inferior, a groove that admits the tip of the fifth finger but there is no sign that this condition is due to a formerly existing disease or that it might have been caused by an external force.

The deviation from the norm which was demonstrated in the specimen described under Chapter III, No. 10, on both process. transvers. of the last lumbar vertebra is exhibited by the same bone of this specimen on one processus transversus (the left). While the right processus transversus is normal, the left is overdeveloped so that it almost represents the size and form of the left half of the first sacral vertebra. There is an articular surface on the lower left half of the last lumbar vertebra and the upper half of the first sacral vertebra. These two surfaces are connected by means of a fibro-cartilage in the same way as is the ilium with the sacrum in the normal pelvis.

Both ossa ilia present a peculiar and striking formation which though not important in reference to our subject made me inclined to reproduce the lateral view of this pelvis (Plate XI). There exists on the posterior part of the external surface of each os ilium a protuberance or ridge the base of which covers almost the whole posterior part of this bone changing the aspect of this surface from the normal concave to convex. A little above the middle of the os ilium this protuberance becomes most evident. It here reaches a height of 11''' while its length as far as it is observable in its anterior-posterior course is 2" 5'''. The resemblance between the ridges on both sides is striking and goes so far that the given measurement is exactly alike on both sides. In order to convey the proper perception of the form of these elevations I do not know any better comparison than a relief of the mountains of Switzerland on a reduced scale.

This pelvis was obtained from a man thirty-eight years of age. LUDWIG GUTMANN by name. His father was a swine herdsman; his mother was a beggar and delivered him in the snow near the village of Scheuern not far from Baden-Baden. We could not find out how he had lived in his youth and what the condition of his health was. He wandered around with his mother as a beggar. When he

was about eighteen years of age he entered the service of a farm house near Baden-Baden as a helper. He was of medium size, stocky, and kept himself bent forward. His manner of walking was unusually awkward and wabbling. Like his father, he also had no nails on the first and second fingers of both hands. He always had an unusually good appetite and was remarkable for his desire to sleep, so much so that it was very hard, sometimes impossible, to arouse him from sleep. On account of this he was discharged from the farm after half a year. Mentally, he was said to be intelligent and quite smart. Later he served as a groom at Mannheim where he died of pleurisy in 1833.

As a postscript to this chapter, I shall briefly mention a deformity which deserves to be considered in the examination of the origin of our special class of deformity.

As the existence of an overdevelopment of both process. transvers. of the last lumbar vertebra (Chapter III, No. 10) has been proven as well as the overdevelopment of one of them in such a manner that it presents almost the size and form of half of the first sacral vertebra (Chapter IV, No. 4), there also exists the opposite, namely the malformation of half of the first sacral vertebra. *While the one half of the first sacral vertebra is normally developed, the development of the other half has been retarded in such a way that only or almost only the processus transversus of a lumbar vertebra is to be seen.* Judging from those cases which have come to my knowledge this deformity appears to be less rare than the former. In a former paper on the obliquely contracted pelvis<sup>2</sup> I mentioned one case of this kind with the following words: "In front of me there lies a well-formed female pelvis on which the left half of the first sacral vertebra is missing while the other half is perfectly and normally developed. The processus transversus on the side on which this sacral deficiency exists is just like the processus transversus of the last lumbar vertebra. Anteriorly and posteriorly there is on this processus transversus an excrescence or round ridge the size of a bean; possibly an ossification centre for the development of that half of the sacral vertebra which has failed to develop." Since that time I have seen two more pelves in which one half of the first sacral vertebra was replaced by a processus transversus like that of

<sup>2</sup>Heidelberg. *Klin. Annalen*, Vol. X, part 3, p. 468.



a lumbar vertebra. The other half was normally formed. Professor SEBASTIAN of Groningen also owns one such specimen. I formerly mentioned the one which is part of the collection of Professor VROLIK of Amsterdam. According to an oral communication of an expert there are several specimens of this kind in the Anatom.-Patholog. Museum of Paris. An exact description of these has been

promised to me. C. C. CREVE<sup>3</sup> is also of the opinion that this unilateral imperfect development of the first sacral vertebra is seen "frequently."<sup>4</sup> See the interesting paper on the vertebral bones of A. RETZIUS in the annual report of the articles of the society of Swedish physicians by A. E. SETTERBLAD (Stockholm 1835).

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<sup>3</sup>*The form of the female pelvis.* Leipzig 1794.

<sup>4</sup>It is a well-known fact that no bone of the whole human skeleton varies as frequently and as considerably from the normal as the os sacrum. According to my own observations and to those conveyed to me by others, I wish to extend this fact to include the entire pelvis as compared to the other parts of the skeleton. For example, among fifty female pelves which have been dissected out of apparently well built persons, none of whom had undergone a difficult delivery, I have not found one which I considered suitable for the demonstration of a normal pelvis. My most intimate and esteemed friend, the worthy Geheinnrat OTTO of Breslau wrote to me on June 10, 1836, that among forty-five female pelves (the number of female deaths which occur annually) which had been collected last winter, there was not one normally developed and well formed. Twenty-five, in fact, were worthy of a place in the pathological museum. As the form of the pelvis for the

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most part determines the direction and position of the head (or any other presenting part) in engaging in and passing through the various passages, and as the variations in the mechanism of labor must be influenced by those forms of the pelvis it is conceivable how only observation of many years continued with energy and courage, without consideration of time enables one to say what is usual, what is normal, etc. It can easily be seen how those inexperienced who wish to be original at all costs, who only produce peculiarities or who like to outdo those from whom they learned, must lose sight of the rule. They raise varieties to the rank of classes, they present the most detailed divisions and subdivisions, etc. They might easily impress those who are not in the position to judge and their number is very great. But they render the subject difficult for the beginner and confuse it so that it is difficult to see the truth.



## V

### Frequency

#### OF THE OBLIQUELY CONTRACTED Pelves

In regard to the frequency of the occurrence of this deformity I wish to state the following: In the relatively short time with special attention to this class of pelves, a remarkable number of cases came to my knowledge. I had no occasion to inspect large pathological collections during this time and could only grasp the opportunities to request inquiries to be made outside when casually presented. It so becomes evident that these cases do not occur very infrequently. May I be permitted to add some further proofs of this statement.

There is no doubt that this deviation from the normal development may easily be overlooked and remain undiscovered. In the male there is no special reason for a detailed examination of this pelvis as our deformity rarely creates symptoms which would attract the attention of the surgeon or the anatomist. The same applies to the female if she goes through labor without difficulty. But even in the case in which the delivery is difficult and has to be terminated artificially the condition of the pelvis remains unknown if the woman remains alive. But even should the woman die after a difficult delivery and circumstances permit an autopsy, this deformity may be overlooked. Apart from the difficulty of exact determination of the size

of the diameters the textbooks and handbooks ordinarily mention just the conjugata, the distance between the symphysis pubis and promontorium, while treating the contracted pelvis and its indications. Therefore, in an autopsy the attention is mainly or exclusively directed to this diameter. Nobody who is not acquainted with the characteristics of our pelves will consequently have the initiative to determine those dimensions which have to be explored in these cases. True, only too true is the saying: "Many a man would seek if he only knew for what to seek." Considering the usual manner of determining the capacity of the pelvis, we cannot be astonished if, during an autopsy, the obstetrician to his great amazement is unpleasantly surprised to find the conjugate much less contracted than he thought it to be in view of the enormous efforts which the delivery through forceps required, or which were needed to deliver the perforated head and the body of the fœtus. The obstetrician who states during the operation that the conjugata is  $2\frac{1}{2}$ " long and who finds it to be  $3\frac{1}{2}$ " or 4" during the autopsy believes that he was deceived or has made a mistake especially since he finds no signs of a former rickets or osteomalacia. He will scarcely feel inclined to exert himself in order to deceive the relatives

of the dead woman and to remove the pelvis for more detailed examination or to undergo the dangerous business of a "resurrection-man."

It thus becomes evident that the usual autopsies are useless for the discovery of our class of pelves which can not be accomplished without an exact and most minute examination and not without measuring dimensions which so far rarely or never have been determined. It is superfluous to be reminded of the difficulties and obstacles which arise in private practice in regard to post mortem examinations, particularly if the physician is interested to explore the most minute detail without promising to reconstruct everything in the best order. For the difficult and time-consuming work of dissecting and preparing a pelvis, the short time available before the body is put into the coffin is by far insufficient. Apart from these difficulties it should be considered that the oblique contraction of the pelvis may occur without ankylosis of a symphysis sacro-iliaca and without unilateral malformation of the os sacrum. Each one of the last two characteristics may take place without the other and, again, without oblique contraction of the pelvis. Only the *coinciding occurrence* of all these characteristics constitute our special class which is the subject of this work.

There is no doubt that here and there pelves of this kind are preserved but their existence is unknown. It is not difficult to conceive why it has not been found necessary to make them known. If a malformation is encountered which can not be included in one of the existing and well-known classes and presents itself as an isolated case whose origin cannot be explained, it does not exert any interest and nobody hurries to publish such a case. Recently a pupil of mine saw such a pelvis in a collection. Unable to conceal his joy at this discovery he carefully examined it, inquired about all the details of the case, etc. The director of the collection replied to the young man in a tone which betrayed as much surprise as some displeasure that he could not conceive why just this pelvis should attract so much attention, as it was neither especially contracted nor had it any other interest (using his own words); it neither belongs to the class of rachitic nor to that of osteomalacic pelves. A very esteemed obstetrician who owned a pelvis of this kind for many years admitted frankly that he never had paid any attention to it and that he never had shown

it to his pupils, notwithstanding the poor collection at his disposal for his lectures, as he would not have known where to place it. In short, as he expressed it, he felt embarrassed by the specimen. Many other reasons may have prevented the publication of such pelves as an incorrect diagnosis or the case may have been diagnosed too late (which occurs readily in these cases), or the case may have been treated improperly, or it may have terminated fatally, or God knows what reasons may be responsible. Physicians do not like to bother with subjects, especially in public, about which they know nothing and which do not fit into any compendium-drawers, which—as we used to say—are too long for the pushcart and too short for the carriage.

Apparently in those pelves described under Nos. 12 and 24 of Chapter III, not our deformity caused their preservation but the discovered pathology of the hip joint. The fate of these specimens, the manner in which they came to enrich our collection of a thus far unknown class of deformed pelves, reminds one of the "Palimpsestæ." But for those changes these pelves would have been as unknown as the "De Republica" of CICERO would have been without ST. AUGUSTINE having written the Commentaries on the Psalms on the same paper. It is equally certain that the male pelvis described under No. 36 of Chapter III has been preserved only for the exostoses of the lumbar vertebræ. It acquired a particular value for the expert owner by its resemblance to the pelvis described in the same paragraph under No. 15 which is part of the collection of the esteemed MONTGOMERY. The authors of *comparat. intersectionem cæsaream*, etc. and C. VON KRAPP would never have thought of mentioning those specimens (which we described above) had they not had in mind the section of the pubic arch. The pelvis VAN DE WYNPERSE described would have been just as unknown had it not found its way into the paper of this learned man because of its ankylosis. Pelves may exist here and there which may prove what we attempt to convey. This is very probable as we only described the cases which were close at hand but we had not the time, up to now, for real explorations.

Among the adversaries of the SIGAULT operation, few cases of ossification of the symphysis sacro-iliaca, of importance for our subject, have been contributed by those who mention this ossification as reason for the impracti-

cability of this operation. Nobody who is intimately acquainted with the history of this debate and who knows how most of the men precipitated the argument will use this as an objection against our viewpoint.

According to all we have said it may be stated that our class of deformed pelves is much more frequently the

cause for difficult labor than is apparent judging superficially from those cases which happened to become known to us. Generally speaking—without considering the sex and the influence of labor—this class can hardly be signified as a rarity.

# VI

## On the Origin

### OF OUR PELVIC DEFORMITY

Regarding the origin or the development of this special class of deformity, those cases which have come to my knowledge up to the present do not permit me to favor definitely any of those views which I have stated in my former treatise. I made at that time the following statement: "(1) the deformity and especially the fusion of the os sacrum and one of the ossa ilia may originate from faulty development. The ossification centres for the formation of half of the os sacrum may be retarded in their development on one side. Nature may therefore favor ossification of the upper sacral vertebræ and the os ilium. (2) The deformity may originate from an inflammatory process or by pressure at an early period of life. The degree and the kind of malformation of half of the os sacrum may therefore be a sequence of the ankylosis. (3) Curvature of the vertebral column early in life may be the cause of the malformation," etc.—I confess that my original opinion about it, namely that the deformity originates neither from exterior force nor from disease but by a deviation in the original development, appears the most probable. I mentioned it publicly in my earlier lectures as well as at the meeting of the society of Natural

Science and Therapy November 24th, 1832<sup>1</sup> and also—in order to learn the opinions of others—in my lecture on the 23rd of September, 1834, in the medical section of the meeting of natural scientists and physicians at Stuttgart.

As reasons which may be considered for the formation of this opinion, I wish to mention:

(1). That intimate and complete fusion of the os sacrum and the os ilium includes the inner structure of the bones as well as its external appearance. There is no trace of growing together of formerly separated parts in the region of the synostosis. Even if some specimens present a small longitudinal ridge or hardly palpable elevations on the upper part of their anterior surfaces (above the pelvic inlet) which can be identified as remnants of a former synchondrosis only by those who know of its normal existence in that region, the rest of the anterior surfaces do not show anything anteriorly, posteriorly or on their lower edges which can be indicative of a former separation. The region in which the synchondrosis ought to exist is smooth, and flat; in short, just like the connection of the three pieces of the os innominatum. Everything is as if formed of one

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<sup>1</sup> *Heidelb. Jahrb. d. Lit.* 1832, No. 12.



piece. The os sacrum and the os innominatum form one bone. Naturally bones may grow together which later do not show any proof of a former separation in the structure of the tissue. But if our fusion of the os sacrum and the os ilium should be considered as a synostosis acquisita as a consequence of inflammation or of pressure, etc., it could hardly be found as complete, as uniform as we find it in all pelves of our class. The opposite might occur. Pelves might be found—I do not doubt their existence—on which the ankylosis is incomplete or partial though the same arrest in development caused it. Such pelves should possibly be considered as transitional states.

(2). The defective formation of half of the os sacrum in its entire length combined with the diminished width of the os innominatum on the same side and especially the fact that the part on which the fusion of the os sacrum and the os ilium takes place does not descend as much as the synchondrosis on the other side and on the normally formed pelvis (Chapter II, No. 3).

(3). That synostoses and deformities occur, as is well known, in other bones and is caused by original deviation of development. Synostosis congenita is usually accompanied by a deformity of the fused bones consisting mostly in arrested development. The esteemed PHOEBUS notes this properly in his paper *On primary fusion of bones*,<sup>2</sup> a carefully and intelligently written manuscript, which we wish to mention briefly. A further interesting proof for our opinion is furnished by a deformed skull which the esteemed TOURTUAL<sup>3</sup> describes masterly. Apart from complete fusion of the bones there exists an atrophy of the bone which is extremely thin and transparent combined with diminished space for the brain hemispheres and with asymmetrical base of the skull.

(4). The truly striking resemblance of these pelves to one another in all important characteristics is so obvious that an expert, very interested in the subject, who had seen one of those pelves and later another pelvis of the same kind could hardly be convinced that the latter pelvis was not the same that he had seen before.

Only he who had occasion to see several pelves of this class is able to realize how striking their resemblance is. Whoever has seen a series of such specimens must have the idea that there is a common cause for this deformity. Does not identity of the effect speak for the identity of the cause? Do we not find a more frequent resemblance to each other in original deviations of development than in those caused accidentally and later?

(5). In none of the cases could a disease or an exterior force be made responsible for the deformity. All cases which have come to my knowledge occurred in young people who had previously been healthy. Also with regard to the person who died at the age of forty (Chapter III, No. 14) it cannot be doubted that the deformity had existed from an early age.

Once more I wish to emphasize that I do not intend to express a decided opinion on the origin of the deformity. In order to clarify this question it would, in my opinion, be necessary to institute the following research work: (1) a detailed study of the development of the os sacrum and the os innominatum from its earliest stage to puberty, (2) comparative studies of our bony fusion with the ankylosis of the symphysis sacro-iliaca without oblique contraction in healthy as well as in diseased conditions of the pelvis, (3) consideration of the different ankyloses whose origin can be proven in human and in comparative anatomy by the history of their development. It also appears very desirable to us that in the publication of such cases the patient's former condition should be considered; indeed it should be traced to earliest childhood, if possible. During autopsies, no less attention should be devoted to the condition of the vertebral column than to the pelvis. In the studies on the origin of our deformity those pelves which we mentioned in Chapter IV should be considered, those on which a part of the first sacral vertebra was missing, also generally those pelves with asymmetrical deviation of development.

Some examinations started by us in the direction here indicated have not as yet progressed sufficiently to come to justified conclusions for publication. The results will follow as soon as possible.

<sup>2</sup>N.A. Acad. Nat. Cur., Vol. XVII, Part II, Page 659.

<sup>3</sup>The deformed skull of a gypsy, aged fourteen, with absence

of sutures and atrophy. In the Med. Ztg. her. v.d. Ver. f. Heilk. in Preussen 5. Jahrgg. (1836) p. 175.

## VII

### On the Influence

#### OF OBLIQUELY CONTRACTED Pelves ON LABOR

The influence which our deformity may have on the progress of labor under otherwise normal conditions is exerted on the progressive descent of the head (or any other part of the fœtus) as well as on all other movements or rotations which it experiences in passing through the normal pelvis. It is evident that the difficulty of progressive motion of the head is in proportion to the contraction of the pelvis and the latter again depends upon the degree of distortion. But there are exceptions to this general rule which without detracting from its truth or correctness fully deserve the attention of the obstetrician in judging this subject. The question is whether the distorted pelvis according to its original formation belongs to the large or to the small pelves. If it belongs to the large pelves it may be, though distorted in a considerable degree, wider in regard to the possibility of the progress of the head than a smaller pelvis with a minor degree of distortion. The relative contraction of our pelves is dependent not only on their degree of distortion but also on their size.

Moreover the contraction of our pelves may be so great that cæsarian section may be indicated in the case of a normal sized fœtus. The cases described above speak only too loudly for this alternative.

Everyone who is acquainted with the normal act of

labor will understand the influence which our deformity has on the manner in which the head presents itself for the act of labor and on the changes of its position while entering and passing through an otherwise normal pelvis. We, therefore, confine ourselves to mention the following considerations. Suppose that the contraction may take place in the direction of the left oblique diameter, the pelvis will then be roomiest in the direction of the right oblique diameter. The pelvis, therefore, offers only as much room for the head that enters the brim with its large fontanelle to the left anteriorly as is necessary in order to push it through the cavity and to the outlet. Every obstetrician will realize that the head under these conditions will not rotate as it usually does in passing through a normal pelvis, i.e., from the right oblique diameter of the pelvic cavity through the transverse into the left oblique diameter, etc.

Those who are acquainted with the mechanism of the advancing head in the normal and the moderately deformed pelvis by use of the natural forces and who know how to use the forceps correctly will know what special consideration has to be given to the application of the forceps in those cases of our pelvic deformity in which the use of this instrument is indicated. It is likewise evident to the

expert obstetrician that in our deformity, considering the possibility of progress of the head through the pelvis or considering the use of the forceps, not only the shape of the pelvic inlet would have to be respected but also the pelvic cavity and the outlet. More difficulties might be encountered from the latter two on account of the converging walls of our pelvis than from the inlet. After perform-

ing a version, or if the fœtus presents itself as a foot or breech presentation, the manual extraction in our case of deformity would have to be managed in such a way that the straight diameter of the fœtal head coincides with the oblique diameter of the pelvis, in which direction our pelvis presents the most room.

## VIII

### Difficulty of Diagnosis

If we realize that a diagnosis of a generally contracted pelvis and especially its kind and degree presents one of the more difficult obstetrical problems, this problem is then greater in the case of our pelvic deformity than in any other class. In none of those cases which have come to our knowledge could any pathological condition, any symptom, any accident, any exterior force be traced as anteceding the malformation of the pelvis. The persons who died after difficult artificial delivery or even undelivered were mostly young women. They all had enjoyed perfect health and were otherwise well built. In short, nothing would indicate a faulty formation of the pelvis. Nothing challenged a more detailed examination of the bony passages. Added to this the most useful means of measuring a pelvis would not discover our deformity. The popular procedure of Baudelocque which not long ago was considered as almost infallible (not by its author who was an excellent and truth-loving man) leads here, as is evident, to great errors. Two proofs have been given by us in Chapter III and another proof is furnished by the case which we described under No. 4. As later learned, Baudelocque's instrument had measured  $7\frac{1}{2}$  inches which indicated a conjugata of  $4\frac{1}{2}$  inches. All other known methods of external examination must likewise, especially in fat people, fail to discover the deformity (much more so if the examiner is unacquainted with its existence).

Others, as well as myself, had occasion to assure ourselves of this fact. The famous author of *Pratique des accouchemens*, praises the advantages of measuring the conjugata by means of the index finger and prefers this method to all other means of measuring it. She states: *Le doigt ne peut pas, je l'avoue, arriver toujours jusqu'à la base du sacrum; mais quel besoin avez-vous alors de mesurer le détroit? J'ai toujours donné comme marque d'une bonne conformation l'impossibilité de sentir la première vertèbre du sacrum.* I must assure this excellent woman that all her dexterity and her great experience would be without any success in our class of pelves. The contraction may be sufficient to make a cæsarian section absolutely necessary. Nevertheless it is often impossible to reach the "angle sacro-vertebral" with the finger. The impossibility of reaching the promontorium indicates in our cases a special contraction.

According to all this it is easily conceived why the pelvic contraction had not been diagnosed before delivery in any of those cases which have come to our knowledge. The difficulty of the delivery and the futile application of artificial means revealed it, but too late! Let us assume, however, that an obstetrician may suspect an actual contraction of the pelvis by the difficult course of delivery, by the futile attempts of delivery by means of the forceps, or by the fact that the patient had been delivered before



by a very difficult forceps or even by craniotomy! As in the case of our species of deformity there are no signs of a former rachitis or an osteomalacia adultorum and as the result of the Baudelocque examination or of the aforementioned popular method of examination by means of

the finger are deceiving, he will be only too easily misled to consider the contraction far less pronounced than it really is and adopt a procedure which is contraindicated by the degree of the existing disproportion.

## IX

### Importance From the Practical Viewpoint

It is almost unnecessary to emphasize the importance which our deformity of the pelvis plays in the practice of obstetrics. The reader who paid some attention to the foregoing description and especially to that of the cases will realize that our new class of pelvis warrants the full attention of the obstetrician. If we consider

(1) What we said about its frequency in Chapter V

(2) That no symptoms, accidents, or any other circumstances lead to the suspicion that this deformity may exist

(3) That all difficult deliveries caused by the deformity occurred in young, healthy and well built primiparae

(4) That its diagnosis is far more difficult than in the other classes of pelvic contraction, that especially the usual internal examination with one or two fingers and also the measurements taken with Baudelocque's *Compas d'épaisseur* may easily mislead the examiner, and that also the rest of the external exploration, especially in obese women, may fail to disclose the existing deformity; in short that its detection is very difficult, that assistance may be given too late or that an unindicated treatment may be employed—which, as we know, leads inevitably to the most formidable consequences in the practice of obstetrics—

(5) That this deformity has never yet been recognized in the living human body, finally

(6) That in all cases of difficult delivery which were caused by this deformity—as far as we know—all mothers and infants died though often attended by the most able and most experienced obstetricians—then if we take all this into consideration it cannot be denied that this subject is of the utmost practical importance. This deformity deserves as much attention from obstetricians as the other pelvic deformities. It deserves as much right to a place in the chapter on pelvic deformities in our manuals and textbooks as the malformations of the pelvis caused by rickets, osteomalacia, etc.

It is obvious that—as we remarked in our former paper (1834)—the subject generally deserves consideration in regard to symphyseotomy and especially by those who consider the contraction of the pelvis in an oblique direction as a proper indication for this operation. The much esteemed ROUX showed this consideration as stated above when he saw the specimens described under Nos. 8 and 9 of Chapter III in the large collection of faulty pelvis at Milan. He emphasized the great importance of this deformity in the practice of obstetrics, especially with regard to symphyseotomy, at the meeting of the *Académie Royale* on the seventh of December, 1834.

# X

## Suggestions and Proposals

### FOR ARRIVING AT THE DIAGNOSIS OF THE OBLIQUELY CONTRACTED PELVIS IN THE LIVING

We have instituted measurements, by different methods, in order to diagnose this deformity of the pelvis. We paid special attention to the following factors:

(1) The measurements had to be taken from points which are easily accessible and which can be distinctly ascertained.

(2) Complicated mechanical appliances as well as difficult, unreliable and, therefore, useless manual examinations had to be discarded.

(3) Dimensions had to be taken which are equal or only slightly different on the well formed and symmetrical pelvis and which differ markedly on the deformed asymmetrical pelvis, in fact to such a degree that they may be used for the diagnosis of the deformity. The following dimensions, in our examinations, were found easily measurable with Baudelocque's pelvimeter:

No. 1. From the tuber ischii of one side to the spina posterior superior ossis ilii of the other.

No. 2. From the spina anterior superior of one

ilium to the spina posterior superior of the other.

No. 3. From the processus spinosus of the last lumbar vertebra to the spina anterior superior of the one and the other os ilium.

No. 4. From the trochanter major of one side to the spina posterior superior ossis ilium of the other.

No. 5. From the middle of the lower edge of the symphysis pubis to the spina posterior superior of the one and the other os ilium.<sup>1</sup>

The following tables indicate the differences we found between those dimensions on eight of our deformed pelves (described under Chapter III). For the convenience of the reader and in order to save him the trouble of looking back to the description of these pelves we indicated in the first column of the following tables right below the number of each pelvis the words "ankylosis right" and "ankylosis left" in order to point out the side of the pelvis on which the fusion of the os ilium and the os sacrum, the imperfect development of the latter, etc., was found.

<sup>1</sup>My friend and former pupil Dr. AUG. CHAVANNES of Lausanne and I instituted these measurements on forty-two female pelves as well formed as we could procure them. In most of the cases the above mentioned dimensions, taken on each side of the same pelvis, showed no difference or only a very small one. The difference in the dimensions, No. 5 especially, never exceeded 2", in the dimensions No. 1 and No. 2 only sometimes 2" to 3" and in the dimension No. 3 in one case 4", in another case 5". Furthermore we found while taking these measurements that the average extent of the first dimension was 6" 6" on pelves of ordinary size, 7" 2-3" on pelves of more than ordinary and large size and 5" 5" on pelves of less than ordinary and small size. The average extent of the second dimension was 7" 10"; 8" 3" on the large and 7" 5" on the small pelves. The average extent of the third dimension was 6" 7-8"; 7" to 7" 2" on the large and 5" 9" to 6" on the small pelves. The average extent of the fifth dimension was found to be 6" 3-4"; 7" 1-2" on the large and 5" 9" on the small pelves. We only published the results of these measurements in order to call attention to these factors. Further measurements made

on a large number of well formed pelves and a comparison of these measurements with those taken on the living (quite a number of which we have also made) will lead to reliable results. These can be used in order to arrive at the diagnosis of the generally contracted pelvis and they would at the same time also further our subject, especially since we have not only to ascertain whether a pelvis is obliquely distorted and the degree of this distortion but also whether the pelvis belongs originally to those of medium, large, or small size. Measurements of this kind are not difficult to take. They advance science and the education of the younger obstetricians who have time and opportunity and who want to, or must, write a paper; and those who must write an Inaugural-dissertation and are in want of a subject will find a much more useful occupation in this work than in the compilation of textbooks or the copying of published papers or the work on fruitless and useless subjects, which only waste time and energy and transforms an old, honorable and useful institution into an empty and ridiculous formality.

Numbers of the Pelves	TABLE I						Measure- ments of each side		Difference between sides		
							In.	Lin.	In.	Lin.	
3	From right tub. isch. to post. sup. spin. proc. left ilium						6	11	}	1	3
Ankyl. left	left	"	"	"	right	"	5	8			
4	right " " " left "						6	10	}	1	11
Ankyl. left	left	"	"	"	right	"	4	11			
6	right " " " left "						5	9	}	1	1
Ankyl. left	left	"	"	"	right	"	4	8			
7	left " " " right "						6	10	}	1	6
Ankyl. right	right	"	"	"	left	"	5	4			
10	left " " " right "						6	4	}	1	5
Ankyl. left	right	"	"	"	left	"	4	11			
14	right " " " left "						7	7	}	2	—
Ankyl. left	left	"	"	"	right	"	5	7			
15	left " " " right "						7	1	}	1	11
Ankyl. right	right	"	"	"	left	"	5	2			
16	left " " " right "						6	10	}	1	—
Ankyl. right	right	"	"	"	left	"	5	10			
TABLE II											
3	From right anter. sup. spin. proc. to post. sup. spin. proc. of left ilium						7	9	}	1	11
Ankyl. left	left	"	"	"	right	"	6	10			
4	right " " " left "						6	7	}	—	10
Ankyl. left	left	"	"	"	right	"	5	9			
6	right " " " left "						7	3	}	1	—
Ankyl. left	left	"	"	"	right	"	6	3			
7	left " " " right "						7	3	}	1	6
Ankyl. right	right	"	"	"	left	"	5	9			
10	right " " " left "						7	2	}	1	2
Ankyl. left	left	"	"	"	right	"	6	—			
14	right " " " left "						8	4	}	1	11
Ankyl. left	left	"	"	"	right	"	6	5			
15	left " " " right "						7	5	}	1	3
Ankyl. right	right	"	"	"	left	"	6	2			
16	left " " " right "						7	3	}	1	—
Ankyl. right	right	"	"	"	left	"	6	3			



Numbers of the Pelves	TABLE III					Measure- ments of each side		Difference between sides		
						ln.	Lin.	ln.	Lin.	
3	From spin. proc. of last lumbar vert. to ant. sup. spin. proc. of right ilium					6	6	}	1	3
Ankyl. left	"	"	"	"	left "	5	3			
4	" " " " right "					6	4	}	1	2
Ankyl. left						"	"			
6	" " " " right "					6	3	}	—	11
Ankyl. left						"	"			
7	" " " " left "					6	1	}	1	1
Ankyl. right						"	"			
10	" " " " right "					6	5	}	1	1
Ankyl. left						"	"			
14	" " " " right "					6	8	}	1	2
Ankyl. left						"	"			
15	" " " " left "					6	1	}	1	4
Ankyl. right						"	"			
16	" " " " left "					6	3	}	—	8
Ankyl. right						"	"			
TABLE IV										
3	From trochant. maj. of right femur to post. sup. spin. proc. of left ilium					9	—	}	1	—
Ankyl. left	"	left	"	"	right "	8	—			
4	" " right " " " left "					8	6	}	1	6
Ankyl. left						"	left			
6	" " right " " " left "					9	10	}	1	$\frac{1}{2}$
Ankyl. left						"	left			
7	" " left " " " right "					7	6	}	1	4
Ankyl. right						"	right			
10	" " right " " " left "					8	3	}	1	6
Ankyl. left						"	left			
14	" " right " " " left "					9	5	}	1	7
Ankyl. left						"	left			
15	" " left " " " right "					8	11	}	1	1
Ankyl. right						"	right			
16	" " left " " " right "					8	7	}	1	5
Ankyl. right						"	right			

Numbers of the Pelves	TABLE V					Measure- ments of each side		Difference between sides	
						In.	Lin.	In.	Lin.
3	From lower edge of symphysis pubis to post. sup. spin. proc. of left ilium					6	11	}	10
<i>Ankyl. left</i>	"	"	"	"	right "	6	1		
4	"	"	"	"	left "	6	10	}	7
<i>Ankyl. left</i>	"	"	"	"	right "	6	3		
6	"	"	"	"	left "	5	11	}	7
<i>Ankyl. left</i>	"	"	"	"	right "	5	3		
7	"	"	"	"	right "	6	6	}	10
<i>Ankyl. right</i>	"	"	"	"	left "	5	8		
10	"	"	"	"	left "	6	9	}	9
<i>Ankyl. left</i>	"	"	"	"	right "	6	—		
14	"	"	"	"	left "	6	7	}	10
<i>Ankyl. left</i>	"	"	"	"	right "	5	9		
15	"	"	"	"	right "	7	—	}	1
<i>Ankyl. right</i>	"	"	"	"	left "	6	—		
16	"	"	"	"	right "	6	5	}	8
<i>Ankyl. right</i>	"	"	"	"	left "	5	9		

As far as I know such measurements have not been taken by anybody on a living person with an obliquely contracted pelvis. But I wish to mention that I and others have taken them frequently and that no difficulty has ever been encountered. I now take the liberty of adding some remarks concerning these measurements.

(a) The measurements of Table I may briefly be called *distantia tuberosa spinalis posterior dextra* and *sinistra*. The difference of these two measurements is very pronounced and is dependent upon the degree of distortion. The cause for this difference is twofold: First—the tuber ischii of the ankylosed side is located more posteriorly than on the other side, the second—the spina posterior superior ossis ilii on the side not ankylosed stands lower than on the other side, a fact which considerably diminishes the distance between these two points. If the ankylosis exists on the left side the distance between the spina poster. super. ossis ilii sinistri and the tuber ischii dextri is found enlarged, and vice versa. This

measurement can be easily taken and not only indicates the oblique distortion of the pelvis but also the ankylosed side and furthermore the direction in which the pelvis is contracted. This is of utmost importance if an artificial delivery should be considered.

It is not difficult to find the spina poster. super. ossis ilii on the living. It is much easier than it might appear to one who never had occasion to look for it. On a thin woman a protuberance can easily be detected next to the os sacrum and from this point the crest of the ilium may easily be traced. On the obese woman the spina is marked by a shallow groove with a hard base which can easily be felt as the skin at this point is firmly adherent to the bone. It is unnecessary to mention how easily the tuber ischii can be recognized even in obese persons. We have to admit that it is not always certain that while measuring these two distances with the pelvimeter, the instrument is applied exactly on the corresponding points of both tubera ischii. But the error that might result from

this difficulty is much too small to influence the considerable difference which exists between these distances in the obliquely contracted pelvis.

(b) It is superfluous to point out the causes for the differences between the other distances indicated above. They are evident from what we have said about the peculiar characteristics of these pelves in Chapter II. We shall, therefore, limit ourselves to the following remark in relation to the diameter of Table III. It is not of importance whether the posterior knob of the pelvimeter is applied exactly on the processus spinosus of the last lumbar vertebra or a little above or below this point. The result will be just as evident if the measurement is taken from a common point in the middle line of the lumbar region. The attempt to determine the inclination of the pelvic inlet by means of a pelvimeter is a very different problem. I have spoken about this in another paper and I refer the reader to Chapter XXX, Lit. D of my Treatise *The Female Pelvis in relation to its position and to the direction of its cavity, etc.*, Karlsruhe 1825.

(c) We explicitly call attention to the fact that—as we mentioned before—the contraction of the pelvis is not only influenced by the distortion but by its original size. This fact should always be remembered in all these or similar methods of determining the deformity of a pelvis.

A further method for the diagnosis of our pelvic deformity shall be mentioned—every obstetrician might easily think of it. It recalls the procedure which ROEDERER used to determine the inclination of the straight diameter of the pelvic outlet. We place a person whose pelvis is well formed with the back to a vertical surface (a wall). The shoulders and the upper region of the buttocks are equally in contact with it. If two perpendicular lines are drawn—one from the point corresponding to the processus spinosus of the first sacral or last lumbar vertebra, the other from the lower edge of the symphysis pubis downward—these two lines will more or less cover each other, i.e. a horizontal line perpendicular to the wall will cut both lines since in the normal pelvis the symphysis pubis as well as the middle of the os sacrum and its spinous processes correspond with the so-called linea media corporis. This is not the case in our pelvic deformity. One of its essential characteristics is the fact that while the symphysis pubis is pushed to one

side the os sacrum is pushed to the opposite side. Thus the middle of the symphysis pubis is located opposite to the foramina sacralia anteriora or even to the symphysis sacroiliaca of the side which is not ankylosed. If, therefore, we place a person with an obliquely contracted pelvis in the above-mentioned position and if we draw the perpendicular lines from the indicated points, we will discover that the anterior line does not cover the posterior line. The posterior line will not be in the imaginary plane drawn perpendicularly from the examining eye through the anterior line and to the wall. It will deviate to the right or left depending upon the side of the ankylosis. The deviation will vary proportionately with the degree of pelvic distortion.

The result of this examination would be less reliable if the posterior line were drawn from the apex of the os coccyx instead of from those points which we indicated. The degree of distortion of the basis ossis sacri from the symphysis pubis would not have been measured correctly since in some of our pelves the os sacrum is either in an oblique position or in its entire length curved laterally.

Other symptoms which are useful for the diagnosis should not be omitted. Such symptoms are, a narrow pubic arch—(though this characteristic is not only confined to our species of pelvis),—a smaller distance between the two spinæ anteriores superiores and the two cristæ ossis ilii, distances which can easily be measured with the pelvimeter, etc.

As this work has not been written for beginners I shall make just a few remarks concerning *the difference between the obliquely contracted pelvis and those pelves deformed in consequence of rickets, osteomalacia, etc.* The anamnesis, other still noticeable sequences of those diseases, the manual examination and the application of the pelvimeter will usually suffice for the diagnosis of those pelves. Were the deformities so slight that they could not be discovered by those means and were we to find some difference in one or the other of those diameters corresponding to the difference which we consider characteristic for the diagnosis of the obliquely contracted pelvis, this difference is unlikely to be as large as in our species of pelves. A faulty diagnosis will be so much less possible for it is understood that one diameter never determines a certain species of pelvis. Only if all diagnostic methods have been applied and only after all results have been found to be in accord-

ance with ours are we permitted to say with certainty "This is an obliquely-oval pelvis, the fusion of the os sacrum with the os ilium is found on this or that side, the contraction exists in this or that direction."

We still have to examine how the pelvis would be affected were the oblique contraction found complicated by rickets or by the sequences of osteomalacia. Without entering into any examination, we confine ourselves to the statement that such cases might exist. No observation of this kind is known. Why, therefore, should we anticipate

nature? Why should we try to invent what nature has not produced? Let us devote ourselves to faithful observation.

The methods of research which we published should not be considered for more than the author had in mind and expressed in the title of this chapter. Far from all pretense he desires that they might be examined and either be replaced by better methods or if found worthy, they might be perfected by experienced obstetricians. Thus they may be useful in extending our diagnostic field.



## Appendix

ON THE MOST IMPORTANT DEFORMITIES OF THE FEMALE PELVIS





# A

## Description

### OF THE MOST CONTRACTED RACHITIC PELVIS EVER KNOWN TO IMPEDE LABOR

I use the publication of this work to describe this pelvis,<sup>1</sup> not only because it is the most contracted rachitic pelvis ever known to impede labor, but also because its shape deviates from the pelvis that is lately, in Germany, considered *characteristic of the rachitic type in contrast to the osteomalacic type*. The expert reader will consequently easily understand why this description precedes my general viewpoints on malformation of the female pelvis.

#### a. Description of the Case<sup>2</sup>

The pelvis here described is that of the wife of the citizen and tailor JOH. SCHW-R of Mannheim. Her father, also a tailor, a slender cachectic looking man, died of tuberculosis of the lungs at the age of forty. Her mother was healthy, seventy-one years old. One of the four chil-

dren died at an early age. One sister was highly scrofulous and suffered from caries of the humerus. After several years some parts of the bone separated spontaneously. Scar formation shortened the arm. Her brother, also a tailor, was short and had crippled legs. He died of tuberculosis at about thirty-five years of age. Our patient, thirty years old, was only 4 feet 3 inches tall and had a pale, grayish look. Everyone was attracted by her large head and prominent forehead. Her lower jaw was prominent, her nose large and wide. Her features were extremely ugly, her walk clumsy, striding, wobbly and insecure. The upper part of the body was tilted backward, the abdomen pushed forward. Her buttocks were ill formed and very prominent. The upper and lower extremities were not distorted. There was no scoliosis present. The vertebral column was curved

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<sup>1</sup>I previously described this pelvis in a paper that one of my gifted pupils who excelled in knowledge and ability, now an esteemed physician at Frankfurt, edited from my notes and under my direction. It was published under the title: FRANC. CAROLI NAEGLE, respond. G. G. Clausio, *diss. inaug. sist. casum rariss. mogostociæ pelvinæ additis observat. de discrim. inter pelvim e rhachitide et pelv. ex osteomal. adultor. deformem*, etc. Heidelberg 1834. 4.

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<sup>2</sup>In presenting this case I quote, with minor omissions, the official report which Dr. JOS. ANT. BEYERLE (a worthy pupil of the elder Stein) and Prof. Dr. STEPH. VON FISCHER of Mannheim, two experienced and able obstetricians, sent to me in my position as president of the department of Obstetrics. This report, before I received it, was verified by those medical officials who were consulted during the delivery. I, myself, received further and complete information from most reliable sources in Mannheim.

forward in the lumbar region. The sacrum projected backward to such a degree that it formed a remarkable prominence. In the erect position the inlet of the pelvis must have been almost in the vertical direction. The short stature arose from the short lower half of the body, from the described curvature of the vertebral column, from the short and compressed pelvic bones and mainly from the short lower extremities. In a sitting position this woman gave, therefore, the impression of a person of nearly average female height. This malformation dated from her earliest youth. Her mode of living furnishes a very precise and convincing explanation as to the origin and cause of the malformation. The facts were collected in the most careful and reliable manner from her husband, her numerous relations and from many other people who knew her most intimately from birth. Those reports correspond with each other in all details. By her remarkable figure she had also attracted the attention of some physicians who had seen her quite frequently and who have sent their observations to me.

From the first years of her life the appearance of this person was characteristically rachitic, i.e. the general sickly appearance, a dry skin, a flabby musculature, a large head with a prominent forehead, the aged face, the large and firm abdomen, swollen joints, a large appetite, poor digestion, the inability to walk, etc. At the age of four or five years she was only able to crawl around on the floor. At the age of seven she made her first attempts to stand and to walk. The development and growth of her body remained constantly arrested. The establishment of puberty in her fifteenth year offered nothing unusual and had not the slightest influence on the deformity of the body. Her figure was at that time the same as we previously described it. Since that time she had neither grown nor diminished in size. She learned to be a tailor and accomplished a good deal in this trade. She worked very hard but was nevertheless always cheerful and industrious. Her intellect was excellent; she comprehended easily, acquired a good general knowledge and became quite smart and even tricky. From her seventh to the thirtieth year of life she always enjoyed the best of health and was never sick. All her relations agreed in the statement that during all this time she never had suffered the slightest pain. She being highly sexed was influenced to marry in spite of the fact that everybody ad-

vised her against it. She herself realized very well and was convinced that the delivery of a child would endanger her life and that she was likely to die from it. She conceived right after her marriage. Her pregnancy proceeded smoothly up to the end of the eighth month, the time when labor started. During the whole time of her pregnancy she felt very well, worked as usual and was fully able to attend to her domestic affairs.

On the morning of December 30th, 1816, she felt slight pains in her abdomen and at about ten o'clock while walking into town she lost an abundance of clear fluid from the genitals. In the evening at about six o'clock she lost some blood; the bloody discharge continued during the whole night. The following day and night she had constant pains and sometimes discharged bloody fluid. On the first of January at ten o'clock in the morning, she had a bowel movement and felt at the same time something protruding from the sexual parts. The midwife who was called at this time found the umbilical cord prolapsed and thought the head of the fœtus to be deep in the pelvic cavity. She was unable to push the cord back and, therefore, called for the advice of an obstetrician. Dr. JOS. ANT. BEYERLE, a surgeon and obstetrician, was called and the result of his examination was as follows: abdomen distended in the form of a ball, somewhat pendulous, not rigid in the absence of pains. Abdominal muscles very thin. The uterus encloses the fœtus firmly and can be pushed from one side of the abdomen to the other. The intestinal canal is distended with gas. Though the mother insisted she felt the fœtal movements no life could be felt during the examination. The navel cord was prolapsed and pulseless; the midwife had wrapped it in a linen cloth dipped in tepid water. Dr. B. tried to perform a vaginal exploration as usual with two fingers. The contraction of the pubic arch prevented this procedure. Forced then to examine with one finger he found all diameters of the pelvic outlet highly contracted. In the pelvic cavity he found a round, globular, hard, immovable body which he was able to palpate anteriorly. This resembled completely the fœtal head pushed firmly into the pelvic cavity and he regarded it as such. Dr. B. consulted the experienced obstetrician and former teacher of midwifery, Dr. STEPH. VON FISCHER, and this physician found exactly the same. Both now started a very careful and minute external and internal examination, the woman be-



ing placed on the back and also in the knee-chest position. The result of this examination was as follows:

(1) The findings of the abdomen, etc., were as described before.

(2) There was a considerable hollow or curvature in the region of the lumbar vertebræ.

(3) The os sacrum was directed extremely backward and compressed from above downward. It presented an enormous and projecting hump. The lower part of the os sacrum and the os coccyx was curved forward to a high degree. It was completely bent forward.

(4) The body found firm in the pelvic cavity and resembling the foetal head was not the head but the upper part of the os sacrum combined with the last lumbar vertebra, pushed into the pelvic cavity. The connecting links of the articular surfaces of these bones gave the impression of sutures.

(5) All diameters of the pelvic inlet were highly contracted. Neither the cervix nor a foetal part could be felt. The true conjugate measured not quite  $1\frac{1}{2}$  inches.

(6) The ramus transversus of both pubic bones curved inward to such a degree that neither on the left side—on which the cord had prolapsed—nor on the right could a finger be forced into the pelvis. The contraction on the left side was still more pronounced than on the right side.

According to the results of this examination both physicians agreed that cæsarian section was absolutely indicated. On account of the importance of this remarkable case the city and county physicians were also consulted. They all agreed about the case. After the patient had given her consent, the operation was performed on the same evening at nine o'clock by Dr. B., in the presence of all mentioned physicians and two surgeons. Dr. B. made the incision in the linea alba and performed the operation with great care and skill. The patient had been catheterized before but no urine had been obtained. In the course of the operation nothing unusual occurred except that the protruding of the omentum, the distended intestines and the urinary bladder caused great difficulty and some delay. The urinary bladder was found to contain some urine and had to be emptied before the incision into the uterus was made. The foetus and the placenta which were found separated were easily delivered through the uterine incision.

The uterus contracted very soon. The loss of blood during the operation amounted to hardly 5-6 ounces. The closure of the wound was rendered very difficult by the distended intestinal loops. Three sutures were inserted and long strips of adhesive tape were applied between them. A many-tailed bandage supported this dressing. The foetus, a girl, was twelve inches long and weighed, with the placenta, five pounds. The foetus and the placenta showed positive signs that foetal death occurred a long time before.

After the patient was put to bed nausea and retching set in. An oily emulsion of opium was ordered and an enema was given every three hours. The patient was put on a fluid, mucilaginous diet. Towards midnight she vomited twice a yellow slimy fluid; after this she slept for three hours. The following morning at nine o'clock the pulse was about 110. The patient was thirsty, her lower abdomen very sensitive. She complained of frequent sharp pains in that region and attributed these to the tightness of the bandage which was subsequently loosened. The patient passed gas but no faecal matter. In the afternoon her respiration became more frequent and the thirst still more pronounced. The pulse was small, intermittent, between 130 and 140. Frequent retching. The expression altered strikingly, became hypocritical. The lower abdomen became extremely sensitive to touch. The drugs previously employed were continued with the addition of calomel. In the evening, pains and thirst increased and the retching continued. The pulse became small, fluttering and very frequent. The anxiety of the patient was such that she did not want to remain in bed. Consciousness disappeared and the patient died at eleven o'clock, twenty-six hours after the operation.

An autopsy was performed on January third in the presence of the physicians mentioned before. When the dressing was removed a loop of gut was found protruding between the first and second sutures. This loop was covered with a pseudo-membrane. After the two lower sutures had been cut about  $1\frac{1}{2}$  pints of reddish, foul-smelling fluid escaped. On opening the abdomen the intestines around the prolapsed gut showed all symptoms of inflammation. The rest of the intestines and organs of the abdomen looked normal. The uterus was in an oblique position and was found in the right side of the abdomen. The urinary bladder, behind the pubic bones, was empty. The uterus

was white-red in color, 7" long and  $4\frac{1}{2}$ " wide. The uterine incision was 2" 9''' long, running in an oblique direction from the right side above to the left downward. Its edges in the centre of the incision were separated from each other at a distance of 1" 3'''. The wall of the uterus was 1" 3''' thick at the body, 8''' at the cervix.

## b. Description of the Pelvis

(Plates XII, XIII and XIV)

The pelvic inlet, looking at the pelvis from above, presents the shape of a playing card heart—the apex of the heart is blunt, its upper part or base is strongly curved inward. It is reproduced in Plate XII. The letter A designates the upper articular surface on the body of the third lumbar vertebra.

The ossa innominata are extremely small and narrow. Like the lower extremities they have been arrested in their development. The iliac bones appear compressed from behind forward. On their inner surface a groove or channel is to be seen running from above outward to below inward similar to a curved or rather bent piece of cardboard. They are, as is the rule in the case of rickets, more transparent both in degree and extent than in the normal pelvis. In general the bones of this pelvis, the three lumbar vertebrae attached to it and also all other bones reveal that thin, slender and weak structure which is characteristic of rickets. The distance between the spina anterior inferior and the posterior end of the linea innominata is 2" on both sides. From the tuber ischii to the most prominent point of the crista ossis ilii is 6" on the right side, 5" 7''' on the left (the normal figure is 7" 5'''). From the tuber ischii to that point of the ilio-pectineal line at which the body of the pubic bone is united with the iliac bone measures 3" on the right side, 2" 11''' on the left (the normal figure is 3" 6'''). The tuber of the left os ischium is on a somewhat higher level than it is on the right side; its ramus ascendens is more curved on the left than on the right. The height of the symphysis pubis is 18'''.

The os sacrum and the lumbar vertebrae are pressed so deeply into the pelvis that the upper margin of the symphysis pubis is on the level of the middle of the body of the fourth lumbar vertebra. A line drawn on its inner surface from the promontory to the place at which the second sacral vertebra connects with the third may be considered a straight line. The curvature of the os sacrum starts only with the third vertebra and is so pronounced that the distance from the apex to the place of union of the first and second sacral vertebrae is only 15'''. The distance between the apex and the promontory measures 1" 9 $\frac{1}{2}$ '''. The middle of the upper half of its inner surface is concave.

The distance between one spina anterior superior ossis ilii to the other is 8" 7'''.

A straight line drawn between these two points cuts the body of the fourth lumbar vertebra 3 lines below its upper articular surface.

### *At the Pelvic Inlet*

From the body of the right pubic bone to the anterior edge of the inferior articular surface of the fourth lumbar vertebra which both lie in the same horizontal plane	5'''
The same measurement on the other side	6 $\frac{1}{2}$ '''
From the upper edge of the symphysis pubis to the body of the fourth lumbar vertebra which both lie in the same horizontal plane	1" 1'''
The distance between the transverse rami of the pubic bones near the region at which each ramus unites with the body of the corresponding pubic bone	1" 7'''

### *At the Pelvic Outlet*

From one tuber ischii to the other	1" 5 $\frac{1}{2}$ '''
The narrowest distance between the ascending rami of the ossa ischii, i.e. at the point at which they curve a little outward (Plate XIII)	1" 1'''

## Introductory Remarks to the Following Paragraphs

It will not be doubted by any experienced obstetrician that the diagnosis of the contracted pelvis, its degree and the kind of the contraction is as difficult as important from the clinical point of view. It would be of no less importance to follow step by step the cause and abnormal development of such a condition. Notwithstanding the interest which the pathologist would have for the knowledge of such process, the clinician, also, would deeply impress on his memory the whole phenomena from its origin up to its highest degree of development. But could we expect with certainty that a disease always results in the same pathological changes? Does this disease always produce the same characteristic changes in the pelvis? Does it never deviate from the course in which it ought to move in accordance with the dogma of our teaching institutions? Unfortunately this is not the case. Nature does not accept our classification and restrictions which try to exclude certain peculiar manifestations. Nature is unconcerned and it is, therefore, inevitable that errors and wrong conclusions easily result, especially if one possesses enough self-confidence or respect for the old doctrine—to derive a *known* product from *unknown* factors. And that is exactly what is done if, for example, one considers as gospel the conception which textbooks describe as typical for the rachitic pelvis. One then examines confidently and permits fantasy to replace what can only be explored with great difficulty or not at all.

To what terrible consequences may, for example, a statement have led as made by LEVRET and repeated by

the elder STEIN and many others: *The narrower the pelvic inlet the wider the pelvic outlet, and vice versa.* Or to quote from the latest German textbook of Obstetrics written by an experienced and celebrated clinician: *The best proof of a well formed pelvis is the fact that the woman once has borne a well developed child.* Or let us consider the statement: “The pelvis may be smaller than usual in all directions but not to a degree that will make labor very difficult or may necessitate the use of instruments.” Nowhere has an obstetrical error graver consequences than in this matter. For this important practical reason I consider it my duty to make some further remarks on the malformed pelvis as my attention was focused on this subject for a long time. In the early years of my practice (in 1805) I, in my position as court physician, had to examine a case in which an obstetrician had been publicly accused of performing a cæsarian section without any necessity. The case had terminated fatally. Several circumstances appeared to speak loudly against the indication of extreme pelvic contraction as given by the obstetrician. Among these circumstances the most important was that the woman had easily borne five well developed children. It was necessary to exhume the body of the woman three months after death. It was a remarkable case and I published this case and a picture of its extremely contracted pelvis in 1811 in *Erfahr. u. Abhandl.* This case made a very deep impression upon me and inspired my interest in malformations of the pelvis much more than all textbooks and lectures combined. This interest was supported and later increased by peculiar and



favorable circumstances which gave me an opportunity to personally examine and publish the most contracted pelvises of each class which ever have been known to cause difficult labor. The case just mentioned was the most contracted pelvis of the osteomalacious type, the case published in the last chapter was the most contracted pelvis of the rachitic type. In a doctor's dissertation through which I intended to introduce into the scientific world a distinguished, industrious and esteemed pupil of mine, I have published the greatest contraction of the pelvic cavity caused by exostosis and also the most contracted pelvises of the generally contracted or too small type.<sup>1</sup>

This rare and fortunate coincidence of circumstances induced me to devote special attention to the subject of the

malformed pelvis. I started research work and examinations, collected all sorts of materials; I finally planned to publish a book on this subject in which I would endeavour to assign the proper place to the obliquely contracted pelvis, the special object of this essay. I stated in the preface the reasons for the change of my intentions. My research work convinced me that the whole subject was open for improvement and thorough corrections. The reader of this essay is likely to be interested in the other malformations of the pelvis. It, therefore, needs no excuse if I take the liberty or consider it even my duty to add the following—in accordance with what experience has taught me—remarks on different points which appear to me especially worthy of correction or which demand it the most.

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<sup>1</sup>"FR. CAR. NAEGLE, resp. El. de Haber, *Dissert, inaug. exhib. casum rariss. partus, qui propter exostosin in pelvi absolvi non potuit, præmiss. nonnullis de partu difficili ob malam pelvis formam in universum et sigillatim ob exostosin.*" Heidelberg, 1830, 4, with three lithographed plates designed by Roux. An abstract of this paper together with small copies of the plates is to be found in *Heidelb. Klin. Annal.*, vol. 6,

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part 3. A translation exists in the 40th volume of *Journ. complém. des scienc. méd.* I was astonished to find on page 245 the contrary of what had been stated in very clear terms on the frequency of cases of difficult labor produced by exostosis in Chapter 17 of the original. This is either a misprint or an oversight of the translator in an otherwise very accurate translation.



## B

### On the Differential Diagnostic Characteristics

#### OF THE CONTRACTED PELVES OF RICKETS AND OSTEOMALACIA

For many years—almost from the beginning of his career as a writer—STEIN, the nephew, revealed a great predilection and special desire to further the knowledge of the malformed pelvis. He tried especially to describe the peculiar nature of the rachitic and the osteomalacic pelvis and to state the characteristics of the differential diagnosis. The authority which Stein acquired by his works on this subject caused most of the German textbooks to repeat his ideas and viewpoints. We find the following statements as characteristic for the *rachitic* pelvis: flat internal iliac fossæ; a greater distance between the two iliac bones and especially between the two anterior superior spines; a diminished concavity of the sacral bone, both in the direction of its length and its width; a diminished conjugata; in contrast to this an unchanged or even increased transverse diameter of the pelvic inlet; an increased distance between the sciatic tuberosities; a wide pubic arch; an increased width of the pelvic outlet on account of the increased posterior position of the apex of the os sacrum. But the most conspicuous marks are: *contraction of the inlet* antero-posteriorly and *enlargement of the outlet*. As characteristic for the *osteomalacic* pelvis we find the following statements: a diminished distance between the anterior superior spines of the iliac bones; compression of the alæ of the iliac

bones antero-posteriorly, increasing to such a degree that the internal iliac fossæ present a furrow running from above downward and from without inward (in the manner of a folded piece of cardboard); more pronounced curvature of the os sacrum and a diminished distance between its upper and lower pole; compression of the pelvis from both sides in an oblique direction, resulting in a curving inward of the transverse rami of the pubic bones; diminished distance from one tuber ischii to the other; a narrow pubic arch (which in some cases completely *disappears*); triangular shape of the pelvic inlet resembling the heart on a playing card; noselike projection of the symphysis pubis anteriorly; contraction of the inlet, sometimes to a higher degree than in the rachitic pelvis, together with contraction of the outlet, etc.

If these last diagnostic characteristics are compared with the shape of the rachitic pelvis described before, it can easily be seen how it could happen that obstetricians mistook this pelvis at first glance—some even after long and detailed examination—for a pelvis deformed by osteomalacia. The distortion of the iliac bones, the pronounced compression of the os sacrum from above downward, the bending inward of the transverse rami of the pubic bones, the diminished distance from one tuber ischii to the other,

the heart-shaped form of the inlet, the contraction of the pubic arch—even its disappearance, the contraction of the pelvic inlet surpassing that of the rachitic pelvis together with contraction of the outlet—all these *essential, characteristic, constant, and peculiar* symptoms of the so-called osteomalacious pelvis are shown by this rachitic pelvis.

The question whether in this case, rickets first and in later years osteomalacia played a part in the malformation of the pelvis could only be asked by one who did not read the life history of this person and what had been said about the condition of the bones, apart from their deformity, curvature, etc. The expert will at first glance diagnose the pronounced rachitic condition of the bones. Only one who is less experienced will overlook the fact that in the illustration the peculiar color of the bones, their thinness, the transparency of the iliac bones, etc., could evidently not be reproduced in the original pronounced manner. The slenderness of the bodies of the vertebræ, their pronounced transverse convexity which is characteristic of rickets is not as apparent in the reproduction as it is on the specimen in which these peculiarities reveal themselves immediately to the expert, leaving no doubt whatsoever of the rachitic character. This specimen—needless to say for many of us—is not the only one of the kind whose form does not fit the mold which some authors have made for the rachitic pelvis. I, myself, have seen two more specimens similar to the one just described; and I have statements of other obstetricians about some others of the same kind. According to a report of my friend, Professor STOLTZ, there are two skeletons of rachitic infants—one of a one-year-old, the other of an eight-year-old in the anatomical collection at Strassburg. The pelvic bones of both reveal a high degree of that distortion which is considered typical for osteomalacia in contrast to rickets: a triangular shape of the inlet like a three-cornered hat, a curving inward of the transverse rami of the pubic bones, a pronounced approach of the sciatic tuberosities, almost complete disappearance of the space called the pubic arch in the normal pelvis, a pronounced curvature of the os sacrum, etc. The very experienced BURNS also states while describing the contraction

and malformation of the rachitic pelvis: *In some instances the shape of the brim is like an equilateral triangle; and although the diameter from the pubis to the sacrum be not diminished, yet the acetabula being nearer the sacrum, the passage of the head is obstructed.*<sup>1</sup> I just received, while writing, a pamphlet<sup>2</sup> from the esteemed Prof. BETSCHLER which mentions two rachitic pelves of the anatomical collection of Breslau—one of them belongs to a girl of ten years of age. Both reveal—as B. explicitly states—that distortion of the bones which I described and which is typical for the osteomalacious pelvis. I see with great pleasure from the note which B. adds that the esteemed OTTO is going to publish shortly an illustration and exact description of these two pelves and of other remarkable specimens. JOS. WALLACH mentions several pelves of this kind in his *Quæstiones de osteomalacia* (Cassellis 1836). Prof. THEOD. BISCHOFF, an esteemed colleague of mine and an expert obstetrician, wrote to me that he had attended a lecture that OTTO gave on this subject for the Anatomical-Physiological section of the meeting of Natural Scientists and Physicians in Prague on Sept. 20, 1837. Prof. J. V. KRUMBHOLZ presented on this occasion a rachitic skeleton from his collection. The pelvic bones of this specimen were distorted exactly in the manner in which we find most of the osteomalacious pelves. Comp. the commentary of VAN SWIETEN on BOERHAAVE's 1316. Aphorism.

STEIN, the nephew, makes the following blunt statement (and others repeat it blindly): *The wide pubic arch is a constant characteristic of the rachitic pelvis; the soft, narrow, sometimes almost disappearing pubic arch is the consequence of osteomalacia.* The cases just mentioned are most striking evidence against the justification of such a statement. The author of one of the newest textbooks—in accordance with STEIN—makes the following statement: *The rachitic pelvis however contracted it may be, always retains its peculiar shape and characteristics. It is absolutely necessary to know these for any exact obstetrical examination.* This statement is wrong and leads to errors in obstetrical practice.

The osteomalacious pelvis which I mentioned before is certainly of interest to any obstetrician since it is—as

<sup>1</sup>*Principles of midwifery.* Chap. VI, Sect. 1. Deformity from rickets.

<sup>2</sup>*Comment. sist. dystociæ decursum in pelvi rhachitica.* Vratislaviæ 1837.

far as I know—the most contracted pelvis of its kind ever known to impede labor. The woman to whom it belonged had easily borne *five healthy and well developed children*. The sixth delivery was a still birth. The seventh pregnancy was terminated by cæsarian section after which she died on the fourth day. The extreme deformity of the pelvis had occurred in a remarkably short time, the bones had regained their normal, hard consistency at the time of the operation. I assumed that an illustration of this pelvis might be welcome to those readers for whom the book in which it is described and copied<sup>3</sup> is not available. I did not care to increase the number of the plates as two illustrations of this specimen have been published before in natural size. On the other hand, I wished to add to these another, a profile view which should enable the reader to fully compare the shape of this pelvis with the above described rachitic pelvis and which should reveal their striking resemblance in regard to the distortion of the bones. I, therefore, presented on Plate XV three illustrations, half the natural size. Fig. 1 shows the pelvis from above, Fig. 2 from the front, and Fig. 3 from the left side. On Fig. 1 the reader looks at the upper articular surface of the third lumbar vertebra.

In order to give a fairly complete conception of the degree of distortion of the bones of this pelvis, it may be

sufficient to state the following dimensions. The ramus transversus of the left pubic bone is curved inward, and is opposite and in the same horizontal plane with the body of the fourth lumbar vertebra. The distance between them is only two and a half lines. The same distance on the other side is six and a half lines. The os sacrum is extremely curved and compressed. Its height is, therefore, only sixteen lines, the distance between the apex and the point of union of the first and second sacral vertebræ is only ten lines. The anterior pelvic wall is pushed upward, the posterior downward—both to such a degree that the upper edge of the symphysis pubis is in the same horizontal plane as the anterior edge of the upper surface of the body of the fourth lumbar vertebra. The rami of the pubic arch converge downward to such a degree (Fig. 3) that they are only three lines apart. The iliac bones appear compressed antero-posteriorly. They are bent like a piece of cardboard and present a furrow running latero-medially and converging downward to form an acute angle. The distance between the spina anterior inferior and that point of the crista iliaca which is opposite to it posteriorly is 2" 4'" on the left, 2" 6'" on the right. A line drawn from one anterior superior spine to the other cuts the upper surface of the body of the third lumbar vertebra on its posterior half.

<sup>3</sup>FR. CARL NAEGELE, *Erfahrungen u. Abhandl. aus d. Gebiete der Krankh. des weibl. Geschlechtes nebst Grundzügen einer Methodenlehre der Geburtshülfe. Mit 4 Kupfertafeln.* Mann-

heim 1812. The third of these plates presents in natural size a view of this pelvis from the front, the fourth shows it from above.



# C

## On the Generally Contracted Pelvis

I. E., WITHOUT DEFORMITY OR MALFORMATION OF THE BONES

### I.

Until now, the generally contracted or equally too small pelvis (*Pelvis simpliciter seu æquabiliter justo minor*) has not attracted the attention of the obstetrician that it deserves because of its influence on labor. Many large German and foreign textbooks either do not mention it at all or just with a few words as of a subject scarcely worth their consideration. Some admit that the too small pelvis may to a certain degree cause difficult delivery but they deny a degree of contraction that would necessitate artificial delivery. In order to prove my statement the reader may glance at the textbooks, especially those written before my work previously quoted, *Diss exh. casum rariss. partus, qui propt. exostosis in pelvi absolvi non potuit* (1830), was published. Even the able BAUDELOQUE dismisses the whole subject with the words: *L'étroitesse se rencontre rarement dans toutes les parties du bassin en même temps*. A dozen of the late English and French text-

books of obstetrics do not even mention the subject. The studious VELPEAU, even, with so many means of information at his command, merely mentions the possibility of *rétrécissement général et régulier*. But he denies any degree that could seriously endanger a delivery. He never had heard—he writes—that on account of this contraction a major obstetrical operation had been necessary. (v. *Traité de l'art des accouch. ou principes de tocologie etc.* Paris 1829, Sec. 1, p. 32.)

### II.

STEIN, the nephew, called attention to the general contraction of the pelvis and devoted one chapter of his textbook<sup>1</sup> to this subject. He undeniably deserves great credit for this action. But here again he was carried away and made general statements in a too dogmatic manner. His own observations and a certain predilection for his own views—excusable as this may be since nobody ever disputed his views—are responsible for such action.<sup>2</sup> This

<sup>1</sup>G. W. STEIN, *Lehre der Geburtshilfe, als Grundlage des Faches*, etc., Elberfeld, 1825.

<sup>2</sup>Nothing endangers a science that is based upon experience more than too general conclusions which—as Bacon says—originate from accumulated observations in minoribus mundi and are extended to mundus major sive communis. Though not agreeing with STEIN's teaching I am far from minimizing his merits. I take pleasure in acknowledging his work on the

malformed pelvis. It is important enough and we should be thankful to him. I am convinced that only ignorance and injustice could doubt or deny its value. It is surprising and unfortunate that Stein's ideas are unknown abroad. Even in his native country they did not find the ready and willing reception which they deserve. The reason for this, I believe, is not founded in Stein's work itself, nor in the indifference of foreign authors to accept whatever is worthwhile, but in the



esteemed man states, for example, that the generally contracted pelvis falls below the normal measurements to a lesser degree than the too large pelvis surpasses them (which latter he assumes to be an inch). He states: *The most extreme contraction below the normal does not exceed half an inch.* And he continues: *One may easily imagine that generally contracted pelves might exist with a more pronounced contraction. If we would have the occasion to explore pelves of this kind—only anatomical specimens would give such an opportunity—we would find that they are beginning, deformed, rachitic pelves, etc.* Two pelves are in our possession whose diameters—just like those of the other two specimens which we mentioned in an earlier paper (1830)—remain one inch and more under normal. This fact certainly speaks strikingly against everything which STEIN states in his book. Brief descriptions of these four pelves follow.

1.

The first pelvis is that of a female, twenty-three years of age, of healthy appearance and well built. The patient was of more than medium height and slender. She always enjoyed the best of health. Soon after a very difficult forceps delivery, the patient died.

2.

The second pelvis is that of a twenty-eight-year-old, well-built woman of medium size. She had a very healthy

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manner in which Stein usually publishes his ideas. It is sometimes difficult for the well-informed German reader to understand the author. It almost appears as if he endeavors to present the most common in a most complicated manner—though his oral lectures are commended for their clearness. Consequently it is so much more difficult to comprehend what he means for those who are not German. The experienced ALEXANDER SHAW, e.g., in his interesting essay, “Of a peculiarity in the conformation of the skeleton in rickets” (Med. chir. transact. Vol. XVII) would never have omitted Stein’s belief that the rachitic pelvis has its origin not only in the bony distortion but principally in the arrested development of the ossa innominata. In the subject “Of the influence possessed by rickets in arresting the growth of the pelvis” he would never have said: “The questions which we have been engaged in considering, have led us to observe a remarkable character in the pelvis when deformed by rickets, which has not been noticed by writers upon midwifery, but which appears, nevertheless, essential for comprehending the true condition of this circle of bones in such cases. It will be found that these authors, while treating of the effects of this disease upon the pelvis, confine their observations to the deformity of the bones, and

appearance, was always well and attracted attention by her beauty. She danced excellently. The first time she delivered a macerated and immature fœtus. The second pregnancy terminated with *ruptura uteri et vaginæ*, undelivered. A comparison of the fœtal head and the pelvis of the mother revealed that in order to get a living child, a cæsarian section would have been absolutely indicated.

3.

The third pelvis is that of a thirty-two-year-old woman of less than medium size. She was, from childhood on, strong, apparently well built and always healthy. The case is especially remarkable and unique since almost all circumstances united to aggravate the delivery. The pelvis was generally contracted, the fœtus was especially large and presented itself with the shoulder. The membranes had ruptured long before the obstetrician arrived. The uterus was firmly contracted around the fœtus. A version was done with greatest difficulty. After futile attempts to apply the forceps a craniotomy was performed. Even then the extraction of the head was very difficult.<sup>3</sup> The patient died twenty-four hours later.

These three pelves have the character of the well-formed, regular, female pelvis both with relation to their diameters and to the shape and condition of the pubic arch. They are in their proportions well-formed female pelves on a reduced scale. The consistency of the bones, their

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to the encroachment produced upon the cavities by that cause; and that they attribute all the dangers met with in parturition to the irregularities of the form of the canal. But after contemplating the imperfect course of development in the body when affected by this disease,” etc. His compatriots certainly would not have considered him the first to make this statement. Even VELPEAU who always collects whatever he can get and who does not refuse to quote the most unimportant notes, the most worthless school exercises included, never mentions a word on the work of Stein in his chapter on the deformed pelvis.

<sup>3</sup>My friend and former pupil, the experienced and able Dr. CARL REUTER of Eltville, Badearzt at Schlangenbad, author of the work: *De partus causis* (Heidelb. 1827) which was awarded the first prize by the medical faculty of Heidelberg, and also author of several interesting papers on Obstetrics has treated this case together with the esteemed Dr. LUDW. CHR. HEIDENREICH (at present assistant-physician at Hadamar). He sent me the pelvis and a description of the case. I shall publish this case with a detailed description of the specimen at another time.

color, strength and texture, etc., are absolutely normal and healthy. One of those specimens is almost plump. Besides these three pelves, I had occasion to see another specimen almost completely similar in every detail to those mentioned before. It also belonged to a well-built woman of more than medium size. She died after a very difficult, artificial delivery the need for which had previously not been suspected.

#### 4.

The fourth pelvis of my collection of highly and generally contracted pelves belongs to the skeleton of a thirty-one-year-old female dwarf, only 3 feet 6 inches in height, but otherwise well-formed. Her father was a tall man, of more than medium size. Her mother had died twenty-five years before and she was said to have been short. Her brother was twenty-nine years old, of medium size and of healthy appearance. The head and extremities of this person were in good proportion to her size. Apart from the facial expression she appeared like a child seven years of age. The joints of the extremities revealed no trace of swelling. The breasts were proportionately developed, the pubic hair was scarce. Mentally and psychologically—like her body—she was a child. She always had been healthy from childhood on. She was amiable, kind and, therefore, very much loved by her father. She took care of housework and other duties with energy corresponding to her ability. At the age of eighteen menstruation started without any difficulty. She menstruated weakly for six-eight days every four-six weeks. The first sexual relations she indulged in were with a normal and well-built man. They were very painful and accompanied by a considerable hæmorrhage. The loss of blood was less pronounced in subsequent cohabitations (ten altogether). She felt well during the whole time of her pregnancy. She comprehended her condition, meditated much about it and conferred with others. She repeatedly and most determinedly had expressed herself against the performance of a cæsarian section, an operation with which she had become acquainted. Her father who surrendered her to our care in the sixth month of her pregnancy had also made the condition that this operation should not be performed. In order to facilitate the normal or artificial delivery, labor was induced by means of warm baths, frictions, etc., in the thirty-fifth week of the pregnancy. Sixteen hours after rupture of the membranes the

cervix was fully dilated. At that time the delivery was terminated by the application of the forceps. Considerable force had to be used. In order to perform the operation an assistant—placed across the bed in a half-lying and half-sitting position—took the small creature on his lap and held her by the legs. The child, a boy, weighed 5 pounds 6 ounces and was dead. During the first few days the patient did well. On the tenth day after delivery, however, she died from indigestion caused by candy of which she was very fond.

The roomy proportions of this pelvis, the size and strength of its bones appear female and, on a reduced scale, well built. From the promontory to the apex of the os coccyx 3" 3". From the tuber ischii to the crista ossis ilii 5" 5", and to the linea innominata ossis ilii 2" 7". The height of the symphysis pubis 11". The straight diameter of the pelvic inlet is 3", the transverse is 3" 7"; the straight diameter of the pelvic cavity is 3" 3½", its transverse diameter is 3". The transverse diameter of the pelvic outlet is 3". The pubic arch, the curvature of the os sacrum, the direction of the descending rami of the sciatic bones and the curvature of the ileo-pectineal line, all fully resemble a female pelvis.

The sacral vertebræ as well as the bodies of the iliac, pubic and sciatic bones are not ossified but united by cartilage. The descending ramus of the pubic bone is united with the ascending ramus of the sciatic bone but in such a manner that the place of union can easily be seen. The sternum consists of four pieces.

The vertebral column and the pelvic bones, briefly the whole skeleton, do not present any trace of thin, slender, rachitic structure. The alæ of the iliac bones, particularly, do not show the degree and extent of transparency seen in the case of rickets. Briefly it can be said that neither the body nor the bones show any trace of formerly existing rickets. Their size is in good proportion to the body.

It is hardly possible to demonstrate a more proportionate development than the skeleton of this person.

This pelvis is differentiated from the former pelves by the fact that the development of the whole body has been arrested at an early stage. The size, thickness, strength and texture as well as the manner in which these bones are united reveal an infantile character. The relation of the



individual diameters to each other, however, the shape of the pubic arch, etc., resemble perfectly the female type at a later period of life. We have received more information of dwarf-like pelves belonging to females who menstruated. They resemble the described pelvis completely but it would be too lengthy to describe them in detail.

### III.

Nobody will deny that the knowledge of the generally contracted pelvis presents greater difficulties than that of the other malformed pelves, either from distortion of the bones or from exostoses; certainly nobody who is acquainted with our endeavours to explore pelvic deformities and with our present knowledge of the generally contracted pelvis. It may appear superfluous to remind the reader of the fact that there is nothing in the anamnesis of these cases which leads us to suspect any fault of the pelvic bones. The generally contracted pelvis has always, or at least most frequently, been discovered by its influence on labor and by the fact that the expulsion of the fœtus could not be accomplished by the normal powers of nature however effective they may have been. How many cases of this kind may have occurred? They probably have not been published because they had an unfortunate ending or because the pelvic contraction or its degree had been realized too late. An operative procedure may have been resorted to which was not indicated and may have terminated fatally. Nobody hurries to publish such cases while those in which medical art—after a proper diagnosis—quits the battlefield crowned with victory, are readily made known. All circumstances and symptoms which arouse the suspicion that such a pelvic deformity may exist or which facilitate its diagnosis are practically of the utmost importance. It, therefore, is our duty to examine minutely and to weigh conscientiously what STEIN, the nephew, an industrious and well-recognized man, had to say about the diagnosis.

*The generally contracted pelvis is limited to individuals of small size without a corresponding delicate formation of the bones. The body reveals a certain lack of pro-*

*portion and a clumsy walk. Former possible deliveries should be carefully investigated.*

He emphasizes the diagnostic importance of a short and disproportionate skeleton by adding—not very clearly: *The too large pelvis is accompanied by a skeleton that is neither very tall nor very slender; but it shows good proportions. This latter fact alone is sufficient for the striking difference from the skeleton of the too small or generally contracted pelvis.*

The cases described above as well as many other cases in which contraction is less pronounced—with a decrease of the diameter from 9 to 7 or 5 lines—do not corroborate any of these statements. They rather strikingly prove the contrary. *Somewhat disproportionate* was not to be noticed in any of our cases of generally contracted pelvis—contracted to a degree which Stein considers impossible—nor in any other case of this type known to us. There was no *clumsy walk*. One of those women, in fact,—as has been mentioned—attracted attention by the beautiful and graceful manner in which she danced. Our case No. 4 reveals a *small skeleton*, not “without,” but on the contrary, *combined with a* “proportionate delicate formation of the bones.” The small skeleton was noticed in two of our cases. The third was of medium, the last two of even *more than medium size*. LUCHINI, a man of vast experience, also states *Pravæ isti pelvis conformationi, scilicet illi, quæ in eo consistit, ut pelvis cavitas in omni dimensione considerata, habito respectu ad reliquum corpus, justo minor sit—obnoxie sunt fœminæ non solum parvæ, sed et procervæ stature.*<sup>4</sup>

Stein further asserts—inconsistent as it appears to us with his sentence quoted above—that *the rachitic constitution is nearest to that which reveals the generally contracted pelvis*. Our cases teach the opposite.

### IV.

Some obstetricians, such as JOHN BURNS, VELPEAU and others, assert that the generally contracted pelvis originates from an arrest of development.<sup>5</sup> If this belief were right the relationship of the diameters to each other

<sup>4</sup>C. E. LUCHINI A SPIESSENHOFF, respond. J. A. Clossman, *Diss. de partu præternaturali ex disproportione inter caput fœtus et pelvim orto*. Heidelb. 1742, section 34.

<sup>5</sup>“The pelvis,” says BURNS, “may be altogether upon a small scale, owing to the expansion stopping prematurely,” etc. (*s.d. Princ. of midwif.* Book I. Chap. VI, Sect. 1).

and the shape of the pubic arch would have to reveal the character of the infantile or the male pelvis. Velpeau states this to be the case.<sup>6</sup> But all those more or less generally contracted pelves, which we and others have seen, speak loudly against such a belief.

Pelves of this kind have, as far as we have seen, nothing in common with the rachitic pelvis. In one of the latest German textbooks of Obstetrics the esteemed author while discussing origin and shape of the generally contracted pelvis repeats almost word for word Stein's viewpoint on the subject of this pelvic deformity. *The slenderness of all pelvic bones, the small size of the iliac bones and the slight curvature of the os sacrum give the impression of a rachitic pelvis. But the pubic arch which in most cases forms an acute angle, reveals the infantile character and the arrest at an early stage of development.* Our observations do not confirm any of these statements.

On this occasion we consider it necessary to mention one specimen of our collection that we regard as just the opposite of the generally contracted pelvis that we described as Number 4 in Section II of Appendix C. It belonged to a woman twenty-one years old, not quite four feet tall but otherwise well proportioned. The size of the diameters of this pelvis, their relationship to each other and the shape of the pubic arch reveal the character of an

infant's pelvis. The straight diameter of the inlet, for example, is larger than the transverse; a relationship found in the infantile pelvis. The ileo-pectineal line is only slightly curved. The pelvic walls converge downward in a funnel-like manner. Instead of the pubic "arch" there is an acute pubic "angle" of 30½ degrees, etc. The bodies of the iliac, sciatic, and pubic bones are not grown together but united by cartilage; the ramus descendens of the pubic and the ascendens of the sciatic bones are fused together. The points of union of the sacral vertebræ, too, are not ossified. The cartilaginous crista ilii was lost during the preparation of the specimen. The last three lumbar vertebræ and half of each femur are attached to the pelvis which every expert will readily diagnose, according to shape and size, as that of a six- or seven-year-old child. The shape and consistency of all the bones has nothing in common with the rachitic bones. The girl, from whom this pelvis was taken, had normal and healthy parents. Mentally she did not develop at all. Only the shape was that of a human being. She never learned to walk. Wherever she was placed she remained, her knees mostly bent; and she moved the trunk backward and forward in a jerking motion. Instead of talking she uttered inarticulate sounds. She never reacted to any stimulus. Sometimes she appeared angry without cause. She then would scratch her face and

<sup>6</sup>"On a soutenu à tort," says Velpeau, "que la cavité pelvienne ne pouvait pas se rétrécir dans un sens, à moins de s'élargir d'autant dans un autre, et que par conséquent, la circonférence de ses détroits ne variait jamais. L'observation a surabondamment démontré que chez un assez grand nombre de femmes le bassin conserve, après la puberté, la plupart des caractères qu'il avait dans l'enfance, qu'il se rapproche plus ou moins de celui de l'homme; partant, que sa capacité absolue reste au-dessous de ce qu'elle doit être dans l'état normal. D'ailleurs, puisqu'on admet bien un excès d'amplitude, je ne vois pas pourquoi on répugnerait à dire qu'il peut être trop petit dans toutes ses directions simultanément; toutefois, ce rétrécissement général et régulier est assez rare, et je n'ai point appris qu'il ait jamais été porté au point de nécessiter une opération grave." (*S.d. Traité élém. de l'art des accouch.* Section 83). This last passage is omitted in the new edition of 1835. Instead it reads: "M. Naegelé, qui conserve deux bassins dont toutes les dimensions perdent un pouce, dit, comme je l'ai observé moi-même, que l'étroitesse absolue est plus commune qu'on ne pense," etc. It is most surprising that Velpeau enjoyed such frequent opportunity to observe these pelves. Three years have elapsed since the publication of that volume of the *Journal complémentaire*, in which he saw the translation of my paper, (mentioned in the last footnote in Appendix A) in the second edition of his *Tocologie*.

These three years were sufficient to enable him to state—from his own experience—the reverse of what he stated shortly before. The author, taking advantage of every publication with an admirable energy, devotes in this second edition a special section on the generally contracted pelvis, under the title "Étroitesse absolue." In this section he mentions one case in which a woman died undelivered, and another, in which the cæsarian section was indicated on account of pelvic contraction. Without considering the famous "Non venit ex horto flosculus ille tuo" he also, in order to prove his reading ability, quotes LUCHINI A. SPIESSENHOFF whose acquaintance—without doubt only by name—he made from my publication. But others practice the same. It is a sort of innocent theft to pick a flower from a stranger's garden and present it as a product of his own. Mr. V. starts the article "Étroitesse relative" which immediately follows on the same page the one we mentioned, with the words: "Malgré ce qui précède l'étroitesse relative ou partielle du bassin n'en est pas moins, pour ainsi dire, la seule qui entraîne de véritables dangers." Does not the death of an undelivered woman or the necessity of a cæsarian section also constitute such dangers? From these statements as well as from those cases which the esteemed Velpeau of *Tocologie* mentions in his subject "Étroitesse absolue" it becomes evident that the subject of the generally contracted pelvis is absolutely unknown territory—terra plane incognita—to the author.



become restless. She ate by herself and had a good appetite. All other functions, hearing and seeing included, were undisturbed. She became sick after being bitten by a companion and died soon after. Her appearance was pale and spongy. Her breasts were large. She had no pubic hair and never menstruated. The autopsy revealed the body covered with a thick layer of fat. There was almost complete lack of muscle substance. The cavities of the body were absolutely normal. The commissuræ of the brain were especially large; the cerebellum not smaller than normal. The sexual organs had the character of the prepubescent period.

The pelvis just described had been arrested at an early stage of development. This person's development had been retarded also in other respects, especially as far as bones, muscles and sexual organs are concerned. Its difference from the pelvis described under number 4 lies in the fact that the latter pelvis—apart from its small size—revealed a well-developed female character, corresponding with the well-developed sexual organs.

According to these observations we would be readily led to conclude that those *pelves arrested at an early stage of development*, whose diameters reveal the same relationship to each other as the *infantile or male pelvis*, and whose *pubic arch presents mostly an acute angle*, are of minute interest for the practitioner. They belong to women who are not apt to need obstetrical help. We do not want to deny that generally contracted pelves might exist whose pubic arch reveals an acute angle, etc., but—according to our experience—this seems to be very rare.

The origin of the generally contracted pelvis is, by far, not as clear to us as it is to those who make sweeping statements about it. They do not observe and explore but state something that appears to them in one or another way

and, therefore, it cannot be different. But the most improbable is sometimes the truth. The subject we deal with, always has to be controlled by experience. *Opinionum commenta delet dies: naturæ judicia confirmat.* Devotion and modesty are the most important virtues of the scientist. Every honest scientist will agree with LICHTENBERG who says: "You never will learn what you believe to know but what, in fact, you do not know." In order to advance in science you have to confess your ignorance (before you start searching). It is not advisable to make unfounded statements or to repeat or paraphrase such from others whom we did not even understand—especially if books which should teach students are concerned. We should never try to teach what we do not know. Only a fool will spend more than he has.

The generally contracted pelves are observed in persons of any size. Their bones have the characteristics which we described in numbers 1-3 in the second section of Appendix C. It appears that these pelves are a play of nature as is the too large pelvis, the disproportionate too large or too small head, etc.

I may be allowed to add the following: Men and women of small size are known who are considered dwarfs though their bones are as strong and thick as found in people of medium size. These small individuals whose pelves usually are quite large demonstrate mostly—according to my own observations—a disproportionate skeleton, either a large head or large hips or something similar. We do not observe this in dwarfs who have thin bones of an infantile character. The three pieces of the ossa innominata and the sacral vertebræ are not ossified but are united by cartilage though these people might be beyond the puberty age or even at an advanced age.<sup>7</sup> The pelvis as well as the other parts of the skeleton in these cases is in normal pro-

<sup>7</sup>Compare the pelvis described under IV of this section. Prof. SEBASTIAN mentions a skeleton of his anatomical collection which belonged to a seventy-year-old dwarf. The iliac, pubic, and sciatic bones of the pelvis are not united by ossification (*Physiologia gener.* Groningae 1835. p. 61). The college of surgeons of Edinburgh also owns the skeleton of a dwarf. The note attached to this specimen marked number 1 reads as follows: "He died upwards of fifty—the skeleton is remarkable as presenting no particular deformity but rather an arrestment in growth and development. The bones of the innominata remain disunited as do the epiphyses. Several of the second set of teeth have never protruded in both jaws for

want of room; these might have subsequently cut the gum on the loss of others. —. Mr. NAYMITH prepared the jaws —, and observes that the lower one in its depth and angle retains the character of the child." I owe this information to a former pupil of mine, the esteemed pathologist of the University of Heidelberg, Dr. KOBELT. He saw the specimen in the autumn of 1835 and added the following to the just mentioned note: "The first sacral vertebra is still separated from the second. This separation probably also exists between the other vertebræ of the sacral bone. The poor preparation of the specimen, nevertheless, prevents an exact examination."

portion to the size of the body. The female sex after the development of the sexual organs demonstrates the female-type pelvis. The question is coming up whether we, perhaps, are dealing with two types of dwarfs.

## V.

The results of our observations on the generally contracted pelvis are the following:

1. The pelvis may remain one inch and more below normal in persons who are beyond the puberty age and who never have been ill.

2. Neither the relation of the diameters nor the shape of the pubic arch of the generally contracted female pelvis demonstrate the infantile or the male type pelvis.

3. There are two species of generally contracted pelvis.

- a.* The pelves of one species are more frequent. Their bones demonstrate the same thickness, strength, texture, etc., briefly—apart from their size—the same physical characteristics as those of the normal pelvis. They are the pelves of well-built, slender individuals of short, medium or tall stature. The appearance of these people is not at all suggestive of this

type of pelvis; detailed examination alone reveals it.

- b.* The pelvic bones of the other species reveal the size, thickness, strength, etc., of infantile bones. The connection of the single bones with each other is also infantile. This species is only seen in very small individuals or dwarfs. The relationship of the diameters to each other, the shape of the pubic arch, etc., are female in those cases in which the sexual organs are developed.

4. The generally contracted pelvis may be small enough to render a normal delivery very difficult or even impossible. Cæsarian section may then be necessary.

5. The generally contracted pelvis (without concomitant large fœtus) is—according to my own cases—more frequently cause for a difficult delivery than obstetricians generally believe.

6. This pelvic deformity deserves as much attention from obstetricians as the other types of deformity, especially since in these cases nothing precedes that is suspicious in any way and demands a more detailed examination. The diagnosis of this deformity is more difficult than in those pelves deformed by rickets, osteomalacia or exostosis.

## D

### The Pelvis Deformed by Exostosis

According to the title of this Appendix, this pelvic deformity remains to be treated. Its rarity, nevertheless, makes it of less importance for the clinician than those deformities heretofore discussed. I limit myself to repeat here what I wrote in a former paper (mentioned at the end of Appendix A). Cases in which a genuine exostosis (*vera seu proprie sic dicta*) is proved to render labor difficult are much rarer than many believe. Some authors of textbooks and handbooks try to mislead the reader by the number of cases which they quote. It certainly is desirable that those cases quoted from others are not repeatedly transferred from one book to the other, in good faith and without control. Only one's own observations should be described. Cases from other authors may be mentioned;

but dubious cases should be valued accordingly and those cases proven false should be rejected and not offered again. Some textbooks accumulate cases quoted from other books, papers and dissertations in a manner most merciless for the beginner who endeavours to acquire knowledge.<sup>1</sup>

Some cases of exostosis in these books are so briefly and incompletely mentioned as if the information about them came from hearsay. In others a marked prominence of the promontory is obviously mistaken for an exostosis; at least there is enough suspicion that such a mistake occurred. Another case again appears very fantastic and unlikely. The rest of the observations which the author quotes excel in the endeavour to produce miracles. The report then deserves no credibility. In another case which

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<sup>1</sup>My position as a teacher may excuse the following comment: I consider it highly desirable that textbooks take into consideration Phinius's *non multa sed multum* if they make quotations. Dissertations without any value and useless explorations of students should not be cited. People should not be induced to spend time and energy reading scientifically inaccurate material. I think we have the right to expect something from a paper which we find quoted in the textbook of a well-known author. It also happens frequently in Germany that papers are published whose title contains the name of a leading scientist or a teacher together with the name of an assistant. The teacher alone may in some cases have done the whole work, in others he may have been an experienced adviser and guaranteed every word. In any case it is not beneficial for the literature and it even represents an injustice to the

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teacher if the paper is quoted solely under the name of the assistant without mentioning the teacher's name. This happens quite frequently; it is annoying and confusing (as we can easily prove). This practice is of less importance if the teacher is still alive. If the quotation from such a dissertation cannot be prevented, his name might be omitted not through ignorance or negligence but for ulterior reasons as may be easily understood. As we all know a doctor's thesis does not necessarily have to be his own work but may be written by another and printed with the first individual's name as the author. This institution is, nevertheless, useful and it also has its pleasant side since a teacher may thus be able to introduce a beloved pupil into the scientific world in a dignified manner. Everybody will readily see the advantage which results for science from this practice.



is mentioned it remains unknown whether the woman ever was pregnant. In other cases it is not mentioned whether a male or female pelvis is reported, etc.

In order to prove this let us glance at those cases which the esteemed VELPEAU reports so abundantly in his *Tocologie*. RULEAU's case is mostly quoted *primo loco*, again and again. Every experienced obstetrician who reads a description of the case will agree that the difficulty during the delivery originated from a different cause than the one described. A German author stated this thirty years ago and the experienced DE LA MOTTE, a hundred years ago. *In pelvis cujusdam obliquæ corpore ossis ischii sinistri osseum tuberculum, magnitudine nucis avellanæ, in pelvis cavitatem prominens erat, quod*, etc.; with these few words AUTENRIETH's case is occasionally mentioned which this author published in *Diss. de vir. nat. med. in situs fet. iniqui. (resp. C. F. Silber)*. Tub. 1799. Of how minute importance is the case of BARBAUT, quoted in *Tocologie*. The original says: *Un de mes confrères, ayant été appelé pour une femme en travail depuis près de 48 heures, on lui dit, qu'elle était accouchée naturellement la première fois après un travail très long; qu'on avait retourné l'enfant au second accouchement; et qu'à celui-ci, cette femme était moribonde; il reconnut à la partie interne du pubis droit une exostose de la grosseur d'un œuf de poule un peu applati?* The case of G. VAN DOEVEREN is quoted wherever the subject of deformed pelvis from exostosis is dealt with. I am convinced that every experienced obstetrician who reads the description will agree with me that the contraction of the pelvis which aggravated the extraction of the head—after a version had been performed—was caused by a markedly prominent promontory and not by an exostosis on the upper part of the sacral bones which—as v. Doeveren says—had the size and shape of one half of a chicken's egg. V. Doeveren, at the end of his description, mentions a case which HENCKEL described in the *3rd Samml. med. chir. Bemerkungen* p. 33, a case which is quoted very frequently. The delivery, as Henckel describes, was aggravated by the prominence of the last lumbar and first sacral vertebræ. An exostosis is not even mentioned. No expert will detect more than a prominence of the

promontory and of the upper part of the sacral bone in the case of HERBINIAUX which dealt with a woman, crippled by rickets. From an impression on the parietal bone which the child showed after a difficult delivery one concluded that there was an exostosis of the sacral bone in the case of DANYAU (*Thèse N. 191, Paris 1816*). A conclusion of this kind is inexcusable for an author of a textbook of Obstetrics especially since the same author—in accordance with the generally known experiences—states, in another portion of the same book (*Suites de couches. Art. I Enfoncement des os*): *On doit redouter l'enfoncement du parietal ou du frontal, quand la tête, appuyée contre l'angle sacro-vertébral, reste long-temps soumise à de violens efforts, quand le détroit est réniiforme, et quand une tête un peu volumineuse est forcée de se mouler comme dans une filière à travers le bassin, qu'elle parcourt*. In the *Frankfurter Zeitung* (April 8, 1778) a case is quoted in which the court-physician FR. J. NAGEL (called NAGELE in *Tocologie*) performed a symphysiotomy for pelvic contraction caused by an exostosis on the anterior surface of the os sacrum. This operation was supposedly *successful* for mother and child, but only the fact that the operation was performed is true. Nagel and the two assisting physicians were convinced of the presence of an exostosis more than two inches long which they felt during examination. The autopsy proved that the pelvic contraction was caused by a markedly prominent promontory. The woman died in eight days; the child fifteen minutes after the operation.<sup>2</sup> The very able Dr. F. SPITZBARTH of Schwelm who performed the cæsarian section for extreme rachitic pelvic contraction and who described this case in v. *Siebold's Journal*, Vol. III, p. 80, also later mistook the very prominent upper part of the sacral bone for an exostosis. In accordance with my own experience W. J. SCHMITT reported to me that he is rarely consulted in a case of difficult delivery caused by a narrow inlet in which a former consultant did not diagnose an exostosis. Most experienced obstetricians know this. Dr. PLESSMANN of Berlin, *professeur de belles lettres en la ci-devant université de Paris* published the case of a woman whose delivery did not advance on account of an exostosis of the hollow of the sacrum. Lacking a chisel, a

<sup>2</sup>J. P. Frank, *Kleine Schriften praktischen Inhaltes*, Wien 1797, S. 60.



scraping instrument or something similar he took recourse to the “matière ignée.” He broke off the hollow handle of an earthenware frying pan. Through this he touched the exostosis with a red-hot handle of a fire-stoker. The exostosis was destroyed like lightning, the head came through immediately and the delivery terminated most fortunately for mother and child. The hero of this description—in a sense of justice—cannot help but praise his own genius. He is modest enough to compare himself with Alexander who cut the Gordian knot. This case is quoted by English, French and German obstetricians but it presents nothing but one of Baron Münchhausen’s boasts. If this case and the description of similar “perforce-treatments” and miracles would have been read in the original book which is full of stage effects, the author would never have been quoted seriously.<sup>3</sup> Whoever reads the description of the case of RAMSBOTHAM<sup>4</sup> will be convinced that the tumor narrowing the pelvic cavity in case No. 60 never was an exostosis. ED. SANDIFORT is misquoted both as concerns the title as well as the page of his book. We cannot assume that the male pelvis with some bony excrescences which he describes in *Observat.* (Lib. II, p. 118) should have a place in *Traité de l’art des accouch.* In the case of DAMOURETTE (from the *Thèse No. 93*, Paris 1822, above *Taille supubienne*), *qui indique*, as Velpeau says, *une exostose qui remplissait tout le bassin*, the tumor consisted of a mass “de petits grains de sable.” The case was that of a sixty-year-old man and had nothing in common with exostosis. In another case mentioned in *Tocologie* S. II, p. 186, quoted from the *Journ. univer.* (originally in *Lond. med. Reposit.* May 1817) a woman in the sixth month of her pregnancy—who had always been healthy—dies suddenly from rupture of the uterus. Nowhere is there one word mentioned of exostosis. The endeavor of the esteemed author of *Tocol.* to accumulate as many cases as possible is best

illuminated by the fact that he describes the same case as two separate cases, namely the one I published in the aforementioned Inaugural-dissertation. The first time he quotes this case from the translation in the *Edinb. Journ.*, with LEYDIG as author. The second time he quotes the case from my original. Lately we find more such duplications of cases in different scientific papers—a sequence of hurried and uncontrolled collecting of quotations. We omit further cases in which—more or less proven—a wrong diagnosis of exostosis was made, as the case of FR. BENJ. OSIANDER,<sup>5</sup> the case in which J. CHR. STARKE performed a cæsarian section<sup>6</sup> and many others.

The existence of pelvic exostoses has been emphasized by the author of a monograph<sup>7</sup> in the following unique manner: *Cum exostoses quæcunque* [read quacunque] *corporis humani sceleti parte inveniantur, facile intellectus est, et in pelvi reperiri, quarum exempla exstant, e.g. in bovis pelve exostosin invenierunt* [read invenerunt] *trium librarum ponderis.*<sup>8</sup> It is certainly of the utmost importance—and agrees fully with our opinion—that the most outstanding men of our science never saw any case of pelvic contraction from exostosis though they had every chance to observe the whole obstetrical field and have left us the treasure of their vast experience, men like PARÉ, GUILLEMEAU, MAURICEAU, P. PORTAL, HEINR. VAN DEVENTER, PUZOS, DE LA MOTTE, P. AMAND, DENYS, LEVRET, SMELLIE, DELEURYE, BAUDELOCQUE, BOER and others.

The less frequent those cases are, the more necessary is it to emphasize those in which there was a true exostosis that rendered delivery difficult or impossible. I did not add copies of the largest exostosis ever known to impede labor—the case I mentioned in the last footnote to Appendix A—to my plates since others have published enough copies and since small copies are added to the extract in vol. 6 of *Heidelb. Klin. Annalen*. But as these cases are rare and as

<sup>3</sup> *La médecine puerpérale, ou des accidens de la maternité par* FREDERIC PLESSMANN *de Berlin, Docteur en médecine, Accoucheur de l’hôtel Dieu sous Desault, et Professeur de belles lettres en la ci-devant université de Paris. A Paris chez l’auteur 1797.* “Exostose dans la vagin guérie par le feu pendant le travail.”

<sup>4</sup> *S.d. Pract. Observ. in midwif.* P. I. London 1832. S. 337.

<sup>5</sup> *Neue Denkwürdigkeiten* by the same author, Vol. 2, p. 125. Goettingen 1799.

<sup>6</sup> *Zweite tabellarische Uebersicht des klin. Institutes zu Jena.* Jena 1784.

<sup>7</sup> J. CHR. VAN PERSYN, *D. de exostosium atque osteosteatomatum pelvis muliebris influxu in partum*, Berolini 1821.

<sup>8</sup> A further specimen of this peculiar logic which we find in this paper may be mentioned: “Tales tumores permagnum in fœtus efformationem influxum habere, jam eo apparebit, fruges campana vitrea superimpositas [lies superimposita] non formam pulchram et naturalem accipere, quam quæ crescunt cælo aperto,” etc. This paper contains not one word of what the title promises; but we find it quoted in some of the newest textbooks of Obstetrics.

the esteemed author of a textbook of Obstetrics—in order to give a representation of every kind of malformed pelvis—had to use an artificial picture of an imaginary exostosis in the pelvic cavity (the exostosis in the large pelvis on Pl. 8 of *Mémorial de l'art des accouch.* also appears to be artificial) I, therefore, considered it opportune to add the picture of an exostosis in the pelvis which necessitated cæsarian section. The pelvis, presented on Plate XVI, has never been shown before and is similar to the one mentioned above. The case is described in Vol. 35, p. 351, of the *Edinburgh med. and surg. Journ.* 1831. The title is *Case of cæsarian operation.* by Dr. M'KIBBIN, Surgeon to the Belfast Lying-in Hospital. Redacted by JOHN WALES Esq. Surgeon, Belfast; and communicated by WILLIAM CAMPBELL M.D. Lecturer on Midwifery, etc. To be brief, I refer the reader to this journal or to Vol. 8, part 2, of *Heidelb. Klin. Annalen*, in which I published a translation of the case as being similar to my own case published before and some remarks concerning both. These two cases, especially, appear very similar.

Other species of pelvic contraction by *Tumores in pelvi, partus impedimentum*, a species which P. DUBOIS and others call *rétrécissement du bassin par obstruction* are much more important than the one just described. These pelves are contracted by tumors of the pelvis which occur much more frequently than a true exostosis. Their influence on delivery is very different and depends upon the nature, consistency and origin of the tumor. These growths consist either of solid or liquid contents; they are more or less soft; some consist of degenerated organs, others of new growths; they may be firm, soft, movable or immovable. They may have a broad base or a thin pedicle, they may be located in any place of the pelvic cavity, etc. It, therefore, is evident that the diagnosis of such tumors and the estimation of their probable influence upon deliv-

ery are very difficult. It is impossible in these cases to set up definite methods of treatment as we do in the cases of bony pelvic deformity per se, with the inclusion of the exostoses which have an influence on delivery similar to that of the bony deformities of the pelvis and which, therefore, demand almost the same treatment. Vast experience, knowledge and ability are absolutely necessary in order to arrive at a correct diagnosis, and to act accordingly. The cases are frequently very different as far as their species and treatment is concerned and they burden the conscience of the obstetrician still more than all those cases of pelvic deformity or exostosis we discussed. In fact, tumors do not belong in the class of pelvic deformities and should not be treated here. The scientific and methodical exploration of this subject has not been tried and most handbooks and textbooks treat it very insufficiently or not at all. It attracted my attention for a long time and I, therefore, would have discussed here briefly the results of my explorations but one of my most industrious pupils, a very able young man, has just started to revise this field of our science. I expect that due to his special interest in this subject and his research work, he will have the best results.

Other abnormalities which are mentioned here or there as reasons to impede labor do likewise not belong in the sphere of this essay. Such are the exarticulation of the femur,<sup>9</sup> protrusion of the bottom of the acetabulum into the pelvic cavity, badly healed fractures of the pelvic bones, deviation of the pelvic inclination from the normal, ankylosis of the os coccyx or of the other bones of the pelvis, etc. These abnormalities very rarely present difficulty in labor. Obstetrical cases of this kind either are mere possibilities or they are products of imagination; they frequently result from misunderstanding or they are misinterpreted for other reasons.

<sup>9</sup>A collector of rarities may welcome a case of this kind. It is mentioned in van SWIETENS Commentary to Boerhaave's aphorisms 1816.

## Explanation of the Plates

Plate I presents the obliquely contracted pelvis described in Chapter III, No. 3, viewed anteriorly and from above. It is of less than normal size.

Plate II presents the pelvis described in Chapter III, No. 14. This pelvis is one of more than medium size.

In Plates I-IV the ankylosis of the symphysis sacro-iliaca and the unilateral malformation of the os sacrum are on the left side. The contraction presents itself in the direction of the right oblique diameter.

Plate III presents a view of the pelvis described in Chapter III, No. 10.

Plate IV is the pelvis described in Chapter III, No. 4.

Plate V presents the same pelvis as Plate IV, seen posteriorly.

Plate VI presents the pelvis described in Chapter III, No. 7, anteriorly and from above.

Plate VII is the same pelvis seen posteriorly.

Plate VIII presents the pelvis described in Chapter III, No. 15, from above and anteriorly.

Plates IX and X. Fig. 1-4, Plate IX, present the pelvic inlets of the pelvis described in Chapter III, Nos. 3, 14, 4, and 10. The ankylosis of the symphysis sacro-iliaca is on the left side in all four pelvises. Fig. 1-4, Plate X, present the pelvic inlets of the pelvises described in Chapter III, Nos. 7, 5, 15, and 9. The synostoses of these pelvises are on the right. The line marked A, B, C-H in Fig. 1 of Plate IX, presents in all figures the circumference of a plane drawn along the upper edge of the symphysis pubis, the ileo-pec-

tineal line and the anterior surface of the sacral bone. The dotted line marked H, I, B in Fig. 1 of Plate IX presents the projection of the promontory on this plane. I represents the middle of the promontory, E the symphysis pubis, G the symphysis sacro-iliaca dextra, C the place at which this symphysis ought to be on the left side. F and D are the regions above the acetabula.

Plate XI presents the male pelvis described in Chapter IV, No. 4, from the right side.

The following plates belong to the Appendix:

Plates XII, XIII, and XIV present the most contracted rachitic pelvis ever known to impede labor (described in Appendix A, *b*). In Plate XII this pelvis is presented from above, Plate XIII from the front and Plate XIV from the left side.

Plate XV gives three views of the most contracted osteo-malacious pelvis ever known to impede labor; it is described at the end of Appendix B. This pelvis belongs to a thirty-six-year-old woman who easily gave birth to several healthy and normal children. The seventh child had to be delivered by *cæsarian* section. In Fig. 1 this pelvis is presented from above, in Fig. 2 from the front, and in Fig. 3 from the left.

Plate XVI presents the pelvis described in Appendix D. It presents a contraction from an exostosis. The pelvis necessitated a *cæsarian* section performed by Dr. M'KIBBIN, physician at Belfast. It is presented from above, anteriorly and somewhat from the left.

**Of This Centennial Edition of Naegele's Pelvis**

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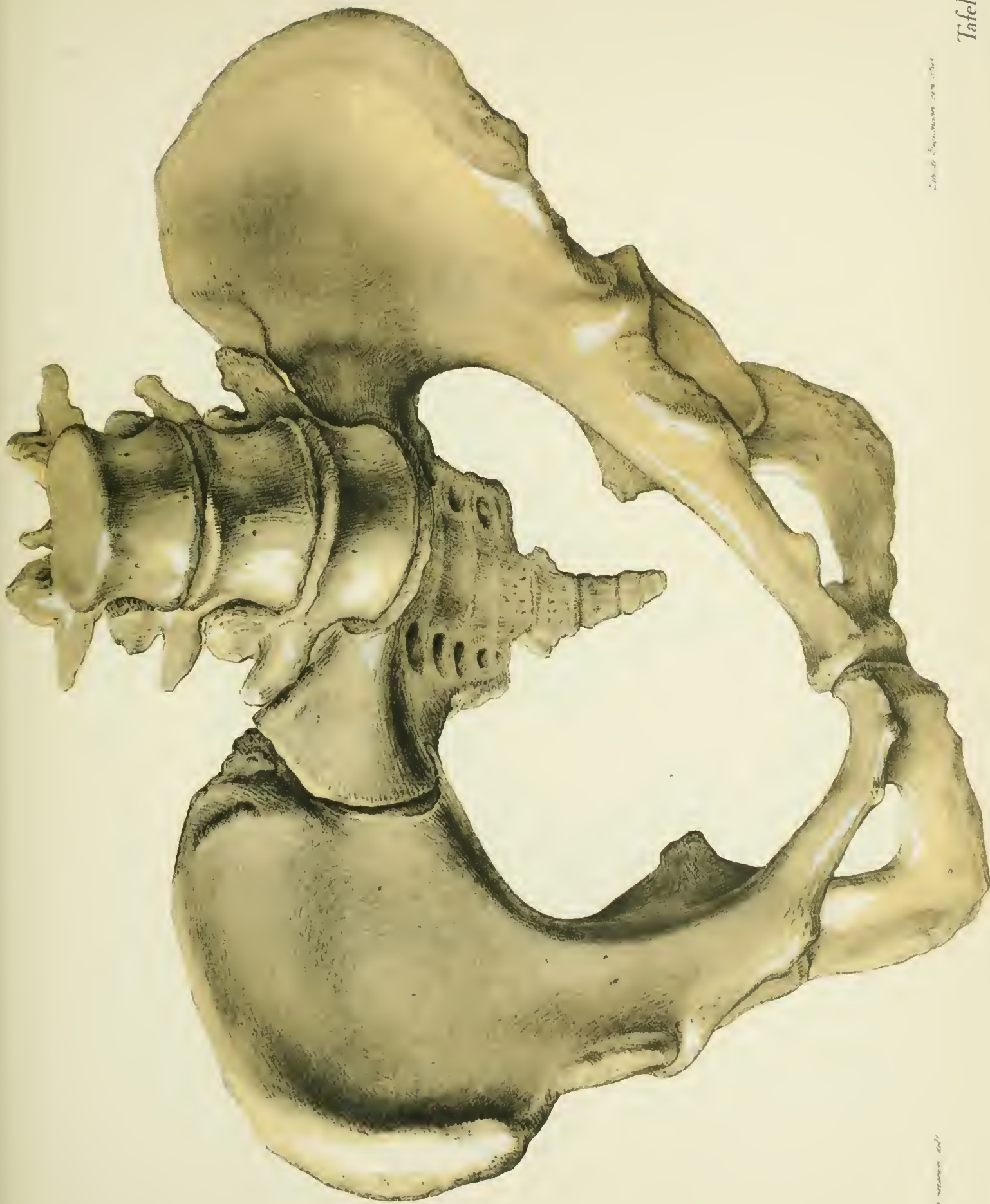
in the month of December, mcm xxx viii

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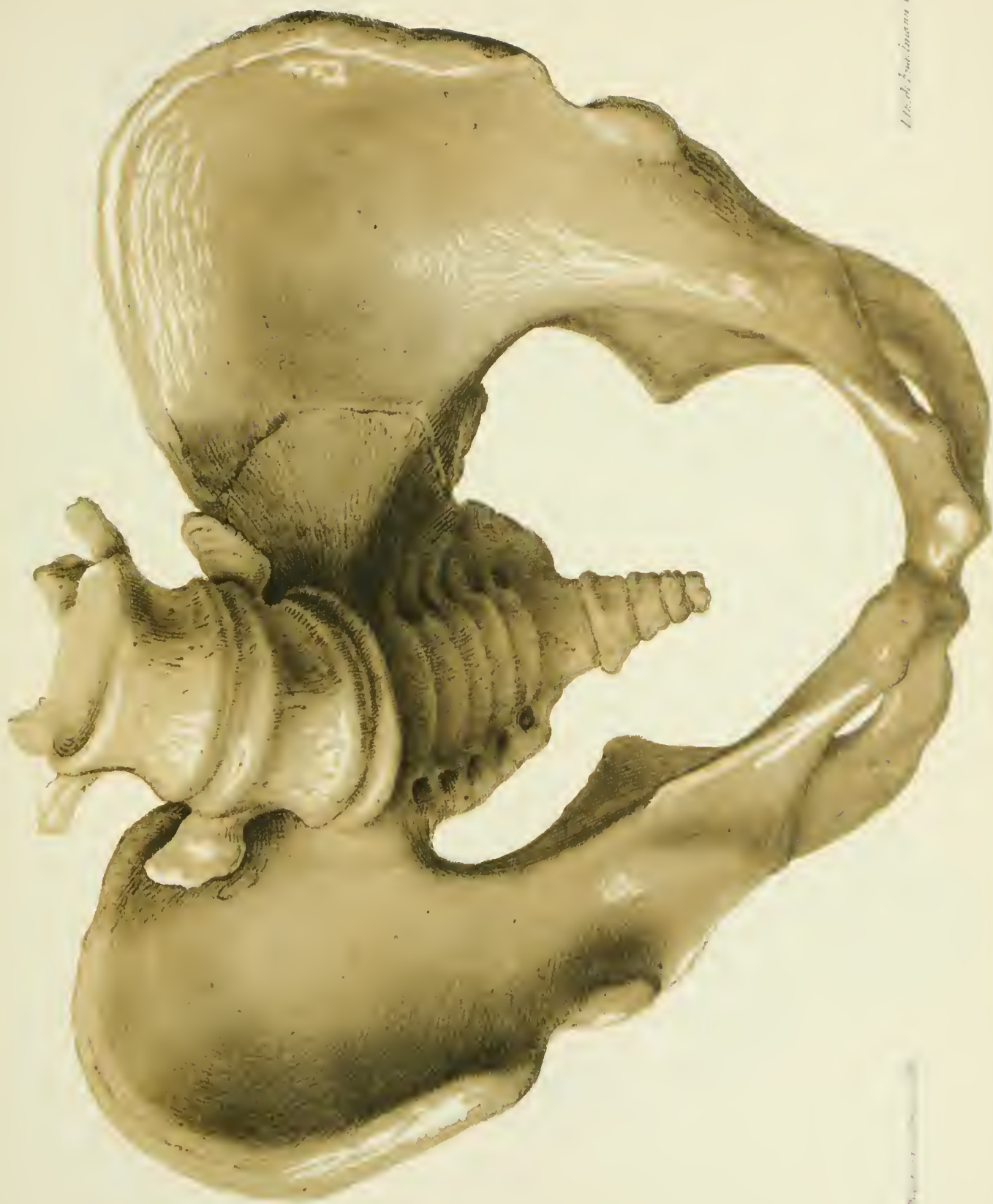












*Uterus, vagina, and ovaries.*







Fig. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.









Fig. 2

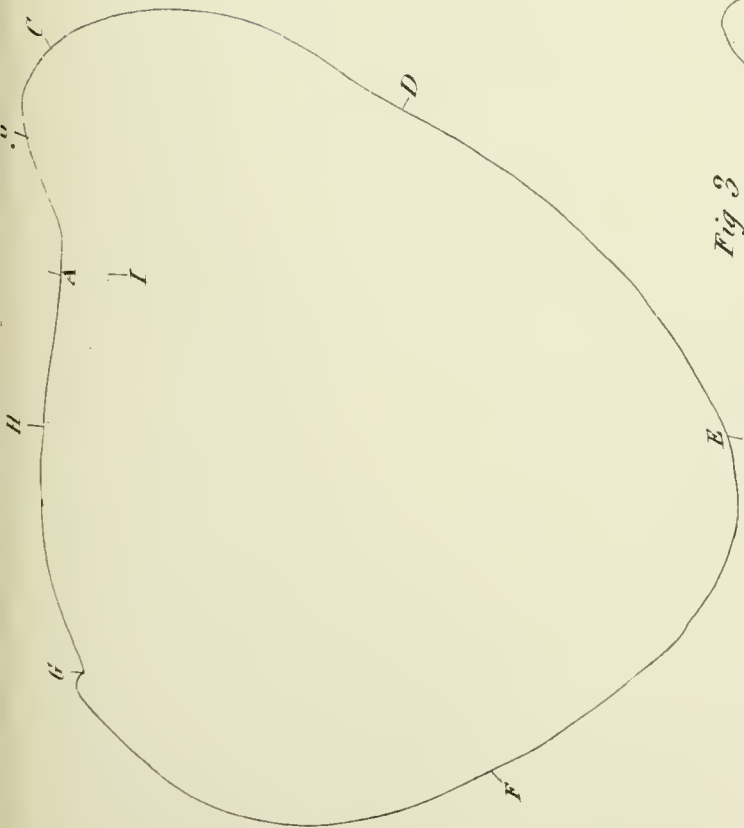


Fig 3

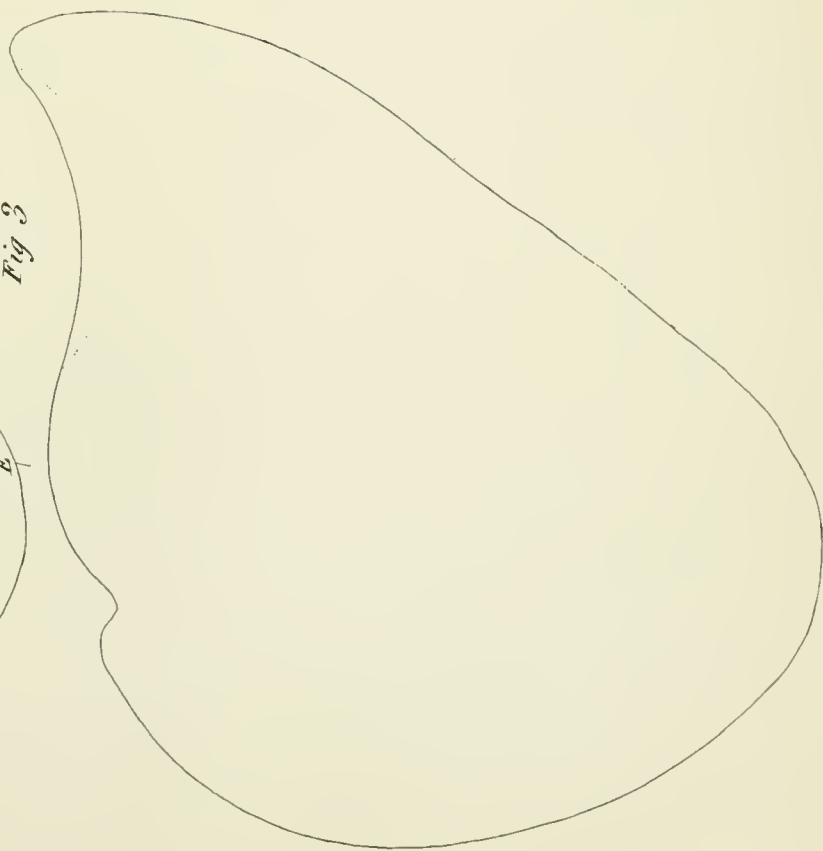
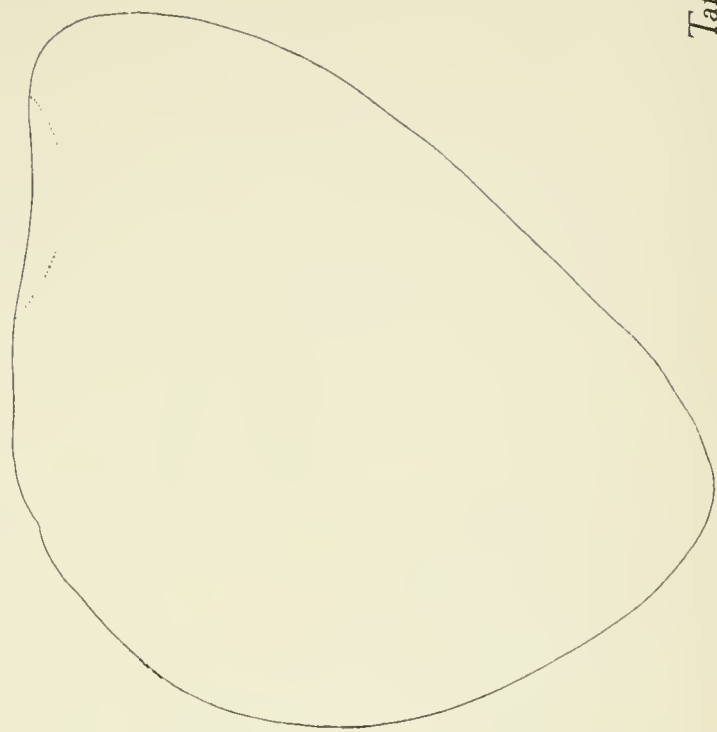
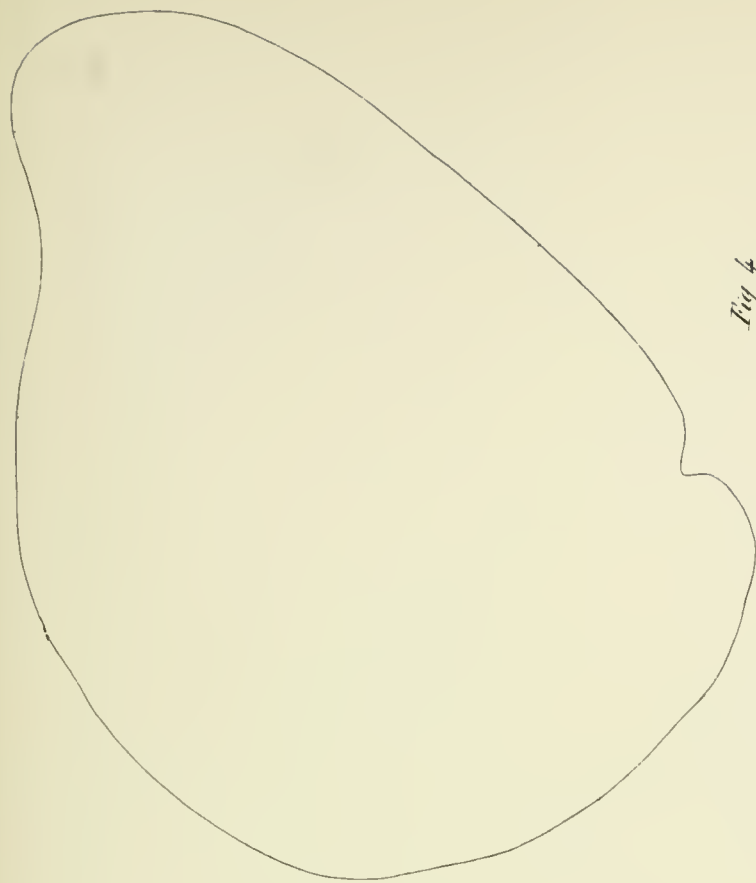
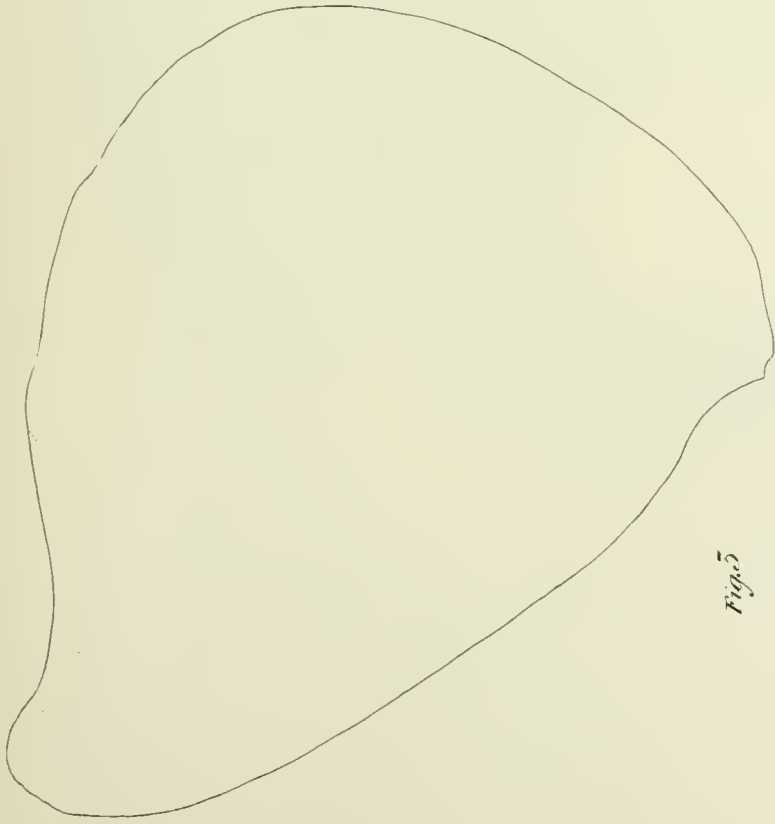


Fig 4





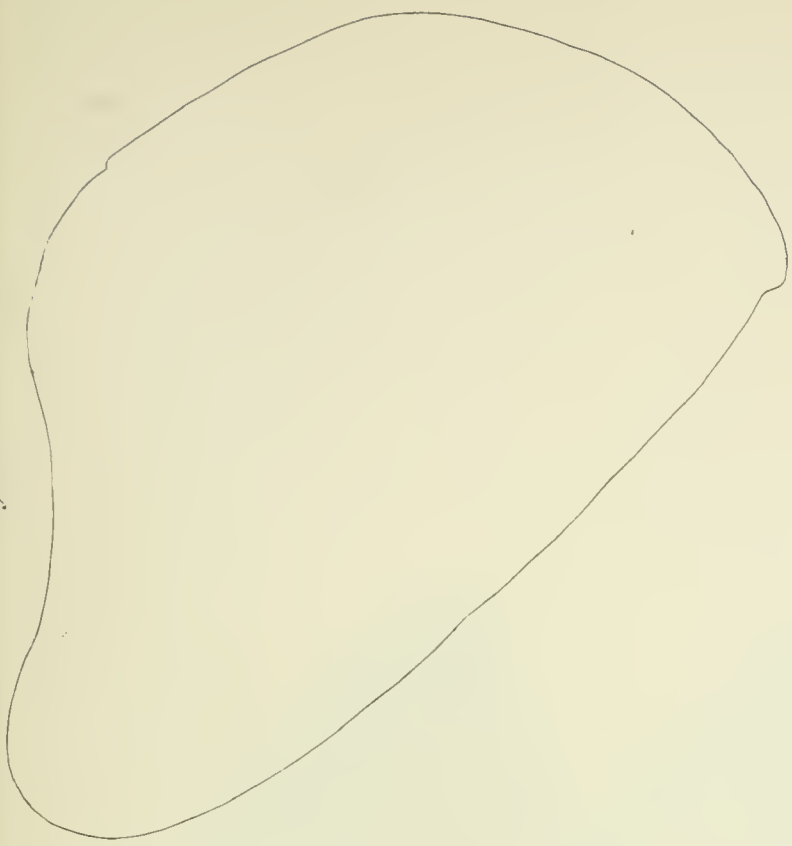
*Fig. 1*



*Fig. 5*



*Fig. 2*

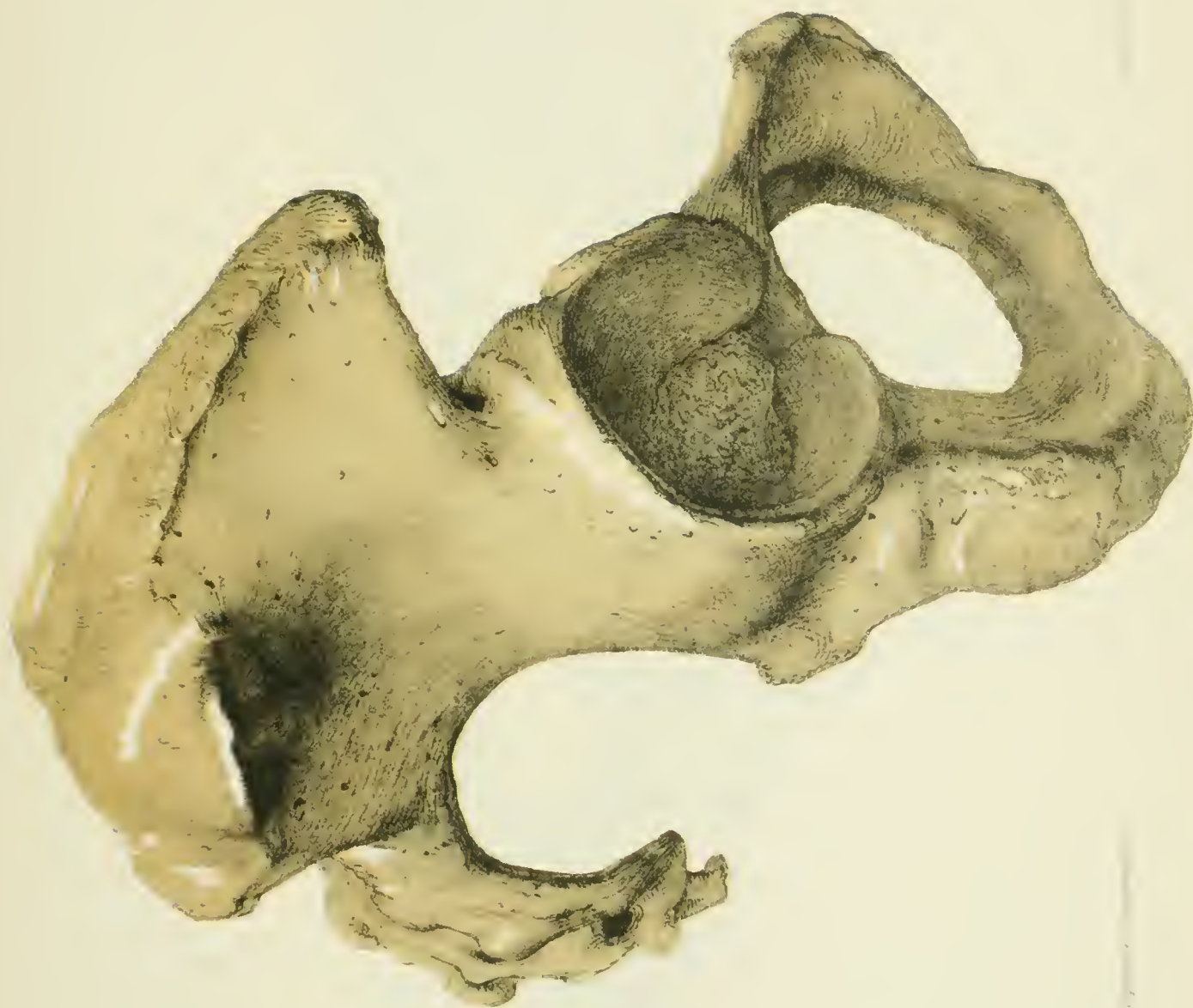


*Fig. 4*







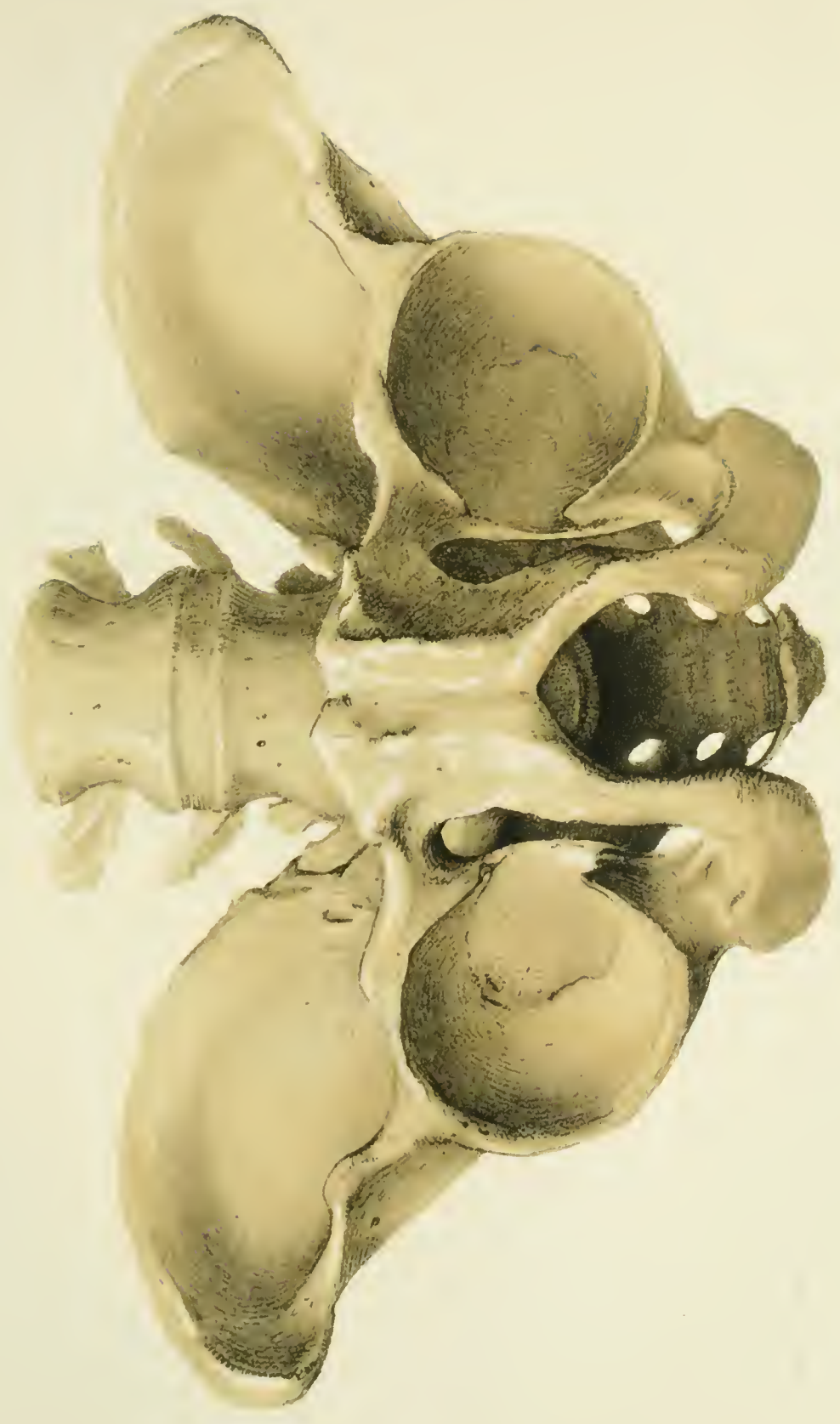




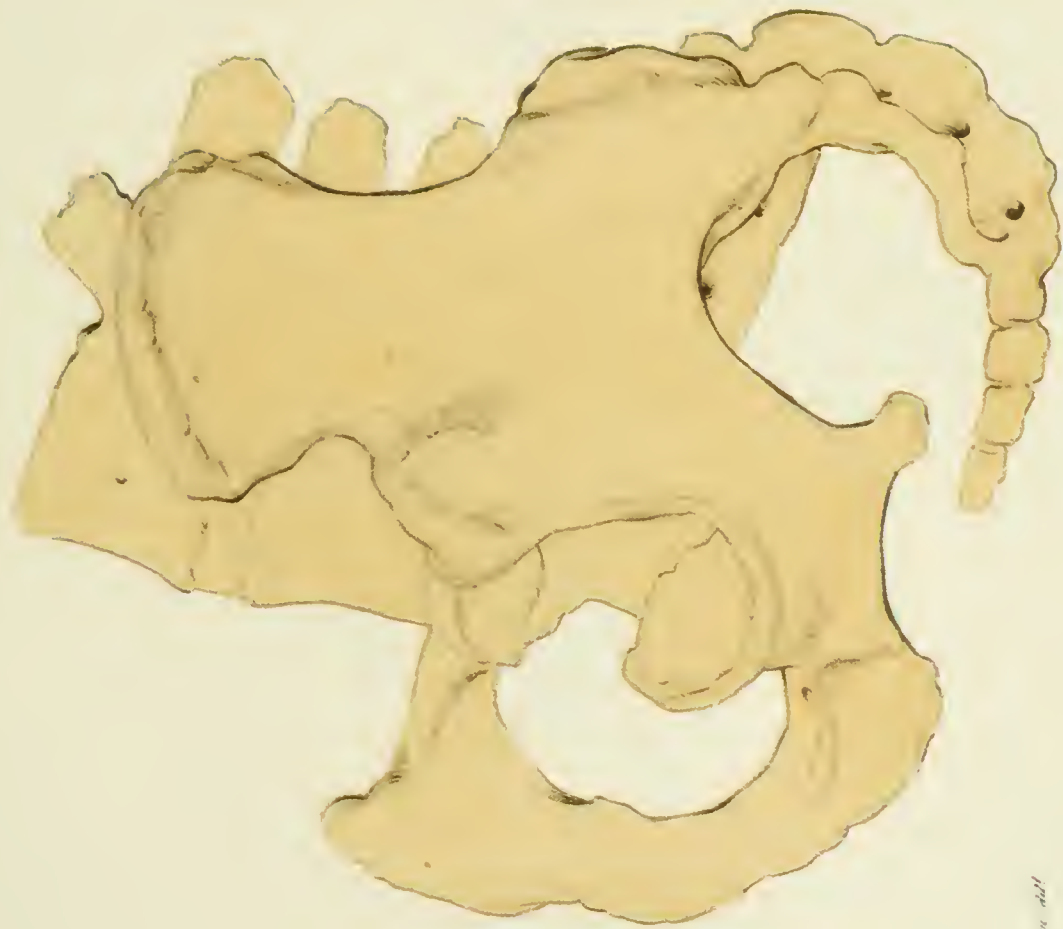












*Fig. 1. Skull of a primate.*

*Fig. 2. Skull of a primate.*





Fig. 1

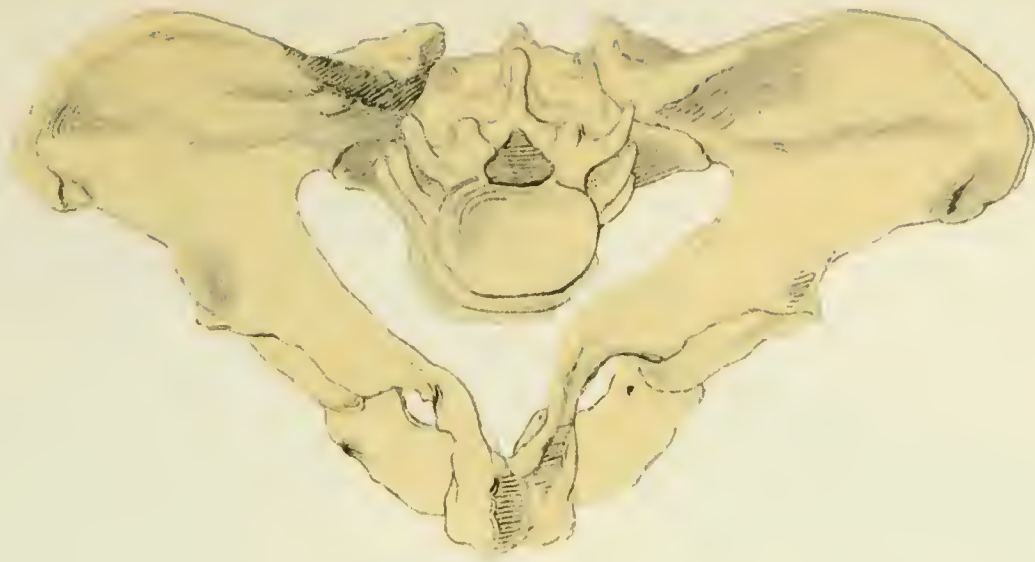


Fig. 2

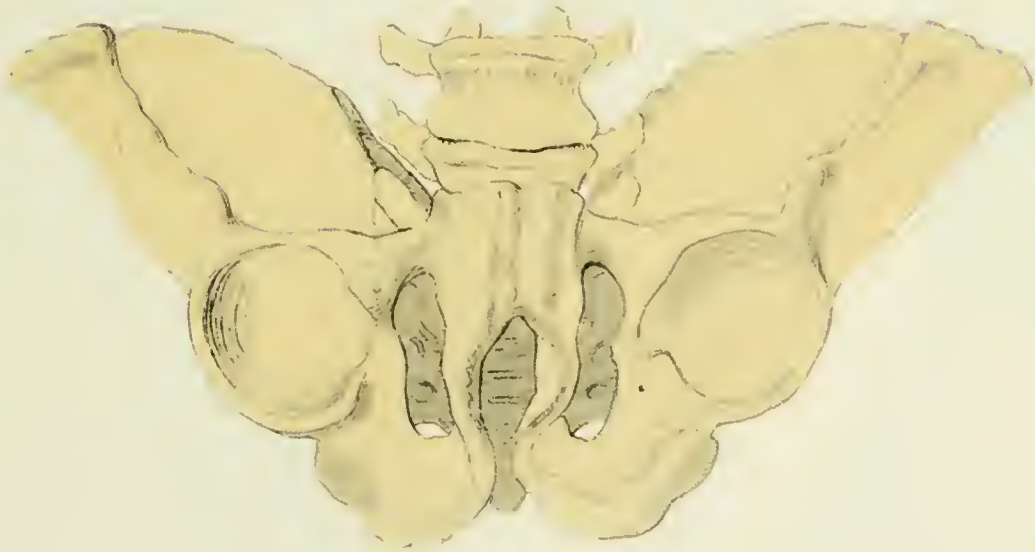
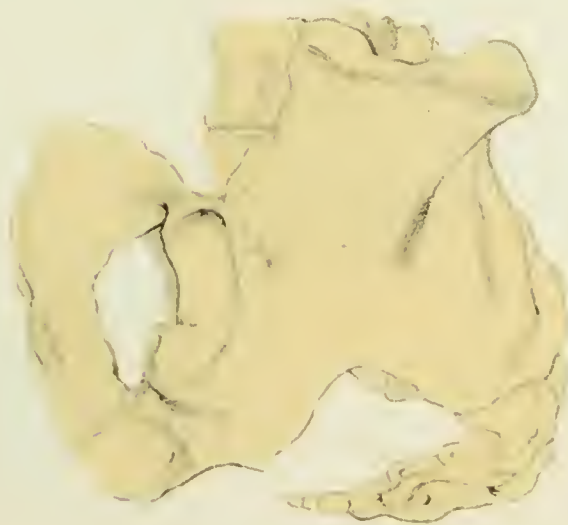


Fig. 3







Tafel XVI.













